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ABSTRACT

Recently, there has been growing criticism of the usefulness of the conventional measures of gross national product (GNP) to reflect the growth of economic welfare. It is argued that GNP fails to allow for certain measures of economic welfare. The object of this study is to examine how much difference would be made to the relative growth rates of countries if estimates were made for the most important of these items, namely leisure and income distribution. The estimates of measurable economic welfare incorporating the adjustment for changes in leisure were made for 13 developed nations for the period 1950-52 to 1971-73 using the Nordhaus/Tobin method and the Usher method of measuring economic welfare while allowing for changes in leisure. The estimates on income distribution were confined to fewer countries and to shorter time periods. It was found that allowance for income distribution has a negligible impact on measured growth rates and that countries that had relatively high growth rates measured in terms of conventional GNP also had relatively high growth rates in terms of economic welfare adjusted for changes in leisure. The results indicate that GNP is still a reasonably good indicator of relative growth rates of economic welfare. (Author/JK)

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Table of Contents

Foreword 3

Chapter 1. Introduction 5

Chapter 2. "Economic Welfare" allowing for changes in leisure 9

I. The Nordhaus and Tobin Method

Chapter 3. "Economic Welfare" allowing for changes in leisure 26

II. The Usher Method

Chapter 4. The adjustment of growth rates for changes in income distribution 38

Chapter 5. Conclusions 50

Annex A. Nordhaus/Tobin Method 54

Annex B. Usher Method 59

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Foreword

During the last few years there has been much concern with the extent to which conventional measures of GNP fail to reflect the "true" growth of economic welfare on account of their failure to allow for certain aspects of economic welfare, such as changes in hours of leisure, the rising weight of "regrettable necessities" (e.g. commuting), or the income distribution dimension of economic welfare. The object of the present study has been to examine how much difference would be made to the relative growth rates of thirteen countries if estimates were made for the most important of these items, namely leisure and income distribution.

Leisure has been selected because in an earlier study for the USA, by William Nordhaus and James Tobin, it was found that the change in leisure in that country over the last few decades had had a far greater impact on their estimates of "measurable economic welfare" than any other of the items that they included, such as environmental deterioration, urban congestion, "regrettable necessities", and so on. However, there is scope for much debate as to the most appropriate method that should be used for adjusting for leisure, and the estimates in this study have been based on a variety of assumptions.

The adjustment for changes in income distribution has been made in the present study because there has been increasing interest in the distributional component of welfare during the last few years.

The estimates of measurable economic welfare incorporating the adjustment for changes in leisure have been made for thirteen advanced countries for the period 1950-52 to 1971-73. It was found that, although different assumptions concerning the appropriate method had a considerable effect on the average rate of growth of all the countries taken together, they had very little effect on their relative growth rates. In other words, countries that had relatively high growth rates measured in terms of conventional GNP also had relatively high growth rates in terms of "measurable economic welfare" as defined here (namely GNP adjusted for changes in leisure), and vice versa. Given the assumption that changes in leisure have far more impact than the other items of economic welfare that are excluded from conventional GNP estimates, the results of this study seem to demonstrate that GNP must be a reasonably good indicator of relative growth rates of economic welfare, after all.

However, the calculations made in this study are experimental and are designed partly to bring out the type of theoretical problems that arise in this sort of exercise. For example, it may well be that more information on the pattern of leisure activities and facilities

in different countries would imply that the assumptions adopted for some countries should differ from those appropriate for other countries, in which case it is possible that relative growth rates might change rather more than the results of this study suggest.

As regards income distribution, the estimates were confined to fewer countries and to varying (and usually shorter) time periods. It was found that allowance for income distribution had a negligible impact on measured growth rates in the countries for which such an adjustment has been possible and over the time periods concerned. But this is because there has simply been very little change in income distribution in these countries during the last decade or so - unlike the previous decade or two. In this respect the results shown in this study differ considerably from those made for a number of developing countries using the same methodology.

These technical conclusions concerning the validity of GNP as a measure of economic welfare in the thirteen countries studies do not of course throw any definitive light on the desirability of economic growth as a social goal, nor do they suggest that Governments may not need other "social" indicators in order to establish policies for the specific goals of welfare that countries wish to pursue. What they do suggest is that GNP continues to be a reasonable measure of aggregate changes in economic welfare.

Chapter 1. Introduction.(*)

During the last few years there has been growing criticism of the usefulness of the conventional G.N.P. measure as an indicator of that part of total welfare that might be defined as coming under the umbrella of "economic welfare". Many critics of the G.N.P. concept have gone much further and complained about the failure of G.N.P. to provide a good indicator of total welfare, although, of course, no economists had ever entertained the idea that it was.(1) And even the doubts as to how far G.N.P. accurately reflected changes in economic welfare have, of course, been the subject of much discussion for many decades. Nevertheless, the recent concern with environmental degradation or with other aspects of life in modern societies, has given a fresh impetus to the critical analysis of the validity of the G.N.P. measure. This has led to some attempts to quantify more precisely some of the items that are not normally included in G.N.P. (positively or negatively) and that are believed to constitute important gaps between G.N.P. and some wider concept of economic welfare.

Obviously, since work along these lines is in its early stages it would be presumptuous to do more than investigate some of the problems that appear to arise in connection with methods of estimation that have already been employed. Hence, the object of this study is to experiment with measures of rates of economic growth over the last twenty years for a number of countries that differed from the conventional G.N.P. growth rates in that allowance was explicitly made for what appeared to be two major elements in "measurable economic welfare". These were (i) changes in total leisure time available; and (ii) changes in income distribution. The reasons for selecting these items are as follows:- Very detailed calculations have been made by Nordhaus and Tobin of "measurable economic welfare" in the U.S.A. over the period 1929 to 1964.(2) They made estimates for a wide variety of "measurable" components of economic welfare which are either normally excluded from G.N.P., or which are included, but, in the opinion of the authors, should be excluded.(3) It transpired that their results are completely dominated by the change in leisure, the various other items being of relatively negligible importance. A similar study for Japan also showed that an imputation for leisure greatly affects the growth rate, although in the Japanese case environmental deterioration played a somewhat bigger role.(4) Hence given the limited scope of this study and given that we are concerned

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(*) In carrying out this study I have been greatly helped by discussions with Professor Dan Usher, and have benefitted greatly from Nick Morris' work on the statistical computations.

(1) See, for example, A. Okun "Social Welfare has no Price Tag", Survey of Current Business, Vol. 51, July 1971.

(2) W. Nordhaus and J. Tobin "Is Economic Growth Obsolete", N.B.E.R., 1972; and (without appendices) in Milton Moss (ed.) The Measurement of Economic and Social Performance, N.B.E.R. New York, 1973.

(3) Thus they estimated the effect of changes in the environment, urbanisation, "regrettable necessities" (such as military expenditure) and changes in leisure time.

(4) Net National Welfare, Economic Council of Japan, 1973.

with comparisons between as many Member countries as possible, it seemed desirable to concentrate on leisure as being the one item that - at least in the study of the U.S.A. - appeared to be by far the most important.

As regards income distribution, this item is not included at all in the Nordhaus and Tobin study, although U.N.O. documents on the extensions that might be made to national accounts include some discussion of the income distribution dimension of welfare. However, some experimental estimates of growth rates adjusted for income distribution have been made at the World Bank (for developing countries), which seemed to have a significant effect on the results.(1) Hence, it seemed to be desirable to make similar estimates in the context of this exercise (although, for reasons set out in Chapter 4 below, the method adopted here differs from that used in the World Bank study).

This study is very different in kind from similar studies that have been prepared recently by the U.N.O. on the extension of national accounts concepts to arrive at a better indicator of changes in welfare.(2) The latter studies covered a very wide range of conceptual problems - many of them of long-standing interest in national accounts theory - such as the boundary line between intermediate and final expenditures of government, and the output of government capital assets, or the extent to which certain consumer expenditures, such as those for commuting, should be treated as intermediate products rather than final output that makes a net contribution to welfare, or the treatment of housewives services. Other newer items were covered, such as the allowance for environmental conditions and pollution, as well as the treatment of leisure activities.

Although these studies included some quantitative information concerning some of these items, no attempt was made - or would have been appropriate in the context - to produce any overall estimates of the impact of the possible changes on the conventional measures of G.N.P. However, as mentioned above, some such estimates have been made by Nordhaus and Tobin for the U.S.A. and by an official government committee in Japan. Apart from pollution damage in Japan, which was found not to be negligible, the Nordhaus and Tobin estimates suggested - as indicated above - that leisure was by far the most important of the items that they accounted for, and these included many of those considered in the U.N.O. reports.

It would be inappropriate, in a single-handed study of the present nature, to try to add to the comprehensive discussion contained in the U.N.O. reports of the wide variety of conceptual amendments that might be made to national accounts. But there did seem to be a useful role to be played by taking one or

(1) H. Chenery, M. Ahluwalia, C.L.E. Bell, J.H. Duloy and R. Jolly, Redistribution With Growth, 1974.

(2) See, in particular, the report by the United Nations Economic and Social Council, The feasibility of welfare-oriented measures to complement the national accounts and balances (E/CN.3/477, 17th Feb. 1976), presented to the 19th session of the UNO Statistical Commission, New Delhi, November 1976, and the earlier report presented to the 18th session (E/CN.3/459), by Professor J.R.N. Stone.

two of the adjustments that have been considered by such reports and other investigators in order to see how much difference they would make to the relative growth rates of a number of countries and to consider further some of the conceptual issues that arise in connection with these particular adjustments. The reason for this lies in a basic theoretical point, that also has considerable practical implications for policy with respect to the direction that should be followed in statistical efforts to move towards some better indicator of economic welfare. The theoretical point is simply that it is difficult - and probably impossible - to attach any clear meaning to the notion of the base level, or zero point, in connection with the notion of "economic welfare". With G.N.P., the concept of zero output is relatively simple. By contrast, the concept of zero economic welfare - indeed, the notion of ascribing absolute, cardinal, values to "welfare" - is a highly dubious one.

If this is accepted, then it follows that differences in national accounting techniques or other allied imputations (such as those that might emerge one day from work on social indicators) that merely generally raise or lower the overall growth rates of whatever it is that is being measured instead of conventional G.N.P. are of interest chiefly insofar as they have a significant impact on the ranking of the countries concerned. That is to say, if we switch from G.N.P. to some other concept, say "Measurable Economic Welfare" and the net effect is that whereas, previously, countries X and Y had been growing at 3 percent and 5 percent per annum, they are now growing at 6 percent and 10 percent per annum, evaluation of "success" or otherwise is not greatly advanced. Country Y is still growing much faster than country X, and it will be of little comfort to either of them to know that a change in concepts has made them both appear to grow much faster than before.

The main gain in knowledge that appears to come from such an outcome is that many reasons have been advanced during the last few years for the view that G.N.P. positively overstates the growth in economic welfare on account of its failure to allow for certain changes, such as those associated with environmental pollution, urban congestion, and so on. The validity of this view is open to doubt since the factors quoted tend to be only those that are believed - often wrongly as a matter of sheer fact - to have deteriorated, and rarely include factors that have improved, such as working conditions, longer expectation of life, and so on, that would tend to produce the opposite conclusion.(1) However, whilst allowance for these factors would tend to improve our knowledge of performance relative to the past, it transpires that most of them make little difference when serious efforts are made to quantify them,such as those mentioned above. Even the increase in life expectancy, which did appear to make a major contribution to economic welfare in the estimates

(1) See,for example, D. Usher "An imputation to the measure of economic growth for changes in life expectancy" in Milton Moss (ed.), op. cit. See also W. Beckerman In Defence of Economic Growth, Chapter 4, "G.N.P., Needs, and Welfare", London, 1974; for a more general discussion of the omissions from the arguments put forward to the effect that G.N.P. overstates the growth of "welfare", and references to some of the literature on this topic.

for Canada produced by Dan Usher, did not make much impact over the post-war period, at least in that country, although in developing countries very different results would no doubt be obtained.

Hence, although it may be of some interest - chiefly as an antidote to otherwise anecdotal and unquantified speculation concerning the extent to which the growth of some concept of economic welfare wider than conventional G.N.P. would show that G.N.P. in general gave a misleading picture of economic welfare - to make some adjustment for what appears, in previous studies, as the most important item, namely leisure, the main interest in any such exercise seems to lie in the extent to which the relative performance of different countries is affected, since it is more by this standard that countries tend to judge - rightly or wrongly - how successfully they are performing. Hence, the following study concentrates on obtaining reasonably comparable estimates for thirteen O.E.C.D. countries of the growth rates of "Measurable Economic Welfare", when this is taken to mean G.N.P. adjusted for leisure. In addition, it also seemed desirable to make some adjustment for changes in income distribution in several of the countries, although this has limited the country coverage and the comparability of the period of time in question.

However, the study is also designed to be experimental up to a point. That is, although it is believed that the quantitative results obtained lead to important conclusions, some attention has been given to the conceptual issues that arise in choosing between the alternative methods of allowing for leisure and, to a lesser extent, income distribution. No attempt has been made to resolve the pros and cons of the alternative methods; the object has been rather to pursue further the theoretical reasons for choosing one method rather than another, particularly in connection with the impact of alternative methods on the relative growth rates of the countries covered.

Chapter 2. "Economic Welfare" allowing for changes in leisure: I. The Nordhaus and Tobin method

As indicated in chapter 1 above, it emerges from the attempts made to adjust the conventional G.N.P. measure for various "missing" items of economic welfare, both positive and negative, that by far the most important adjustment quantitatively is for "leisure" time. This chapter and the following chapter are devoted, therefore, to estimates of growth rates of "economic welfare" when this is interpreted to mean the growth rate of G.N.P. as conventionally measured plus an imputation for leisure time.

The notion that leisure time should be incorporated into the analysis of economic activity is not a new one. The conventional theory of the supply of labour has been traditionally drawn up in terms of an individual making the optimum allocation of his total time between income and leisure, when the constraints consist of the total time available to him and the real wage, which represents the rate at which he can trade off leisure against income, or consumption goods.

As already discussed in chapter 1, innumerable items may be thought to contribute to total social or individual welfare defined widely, or to "economic welfare" defined more narrowly. Where to draw the dividing line between "economic" and "non-economic" welfare is basically an arbitrary judgement, and hence there is always room for differences of views as to whether leisure should be regarded as an input into economic welfare or should be classified as lying outside the range of that part of social welfare that can be brought directly or indirectly into relation with the measuring-rod of money (to use Pigou's famous expression).[1] But the conventional view is that, in principle, leisure is one of the more readily measurable components of economic welfare since it is more or less directly marketed in the sense that the supply of labour is, in effect, the sale of leisure time. Roughly speaking, therefore, the value of leisure at the margin may be valued at the real wage rate since this can be regarded as the

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(1) A.C. Pigou, The Economics of Welfare, 4th edition, 1932, ch. 1, page 11.

price extracted for giving it up and working instead. This is the basic principle underlying all the methods used below to evaluate the change in leisure time over the last twenty years or so in the thirteen countries covered in this study.

This basic principle still leaves open various questions, and since there is room for reasonable differences of views as to the answers and this study is essentially of an illustrative and experimental character, the estimates made here of the value of changes in leisure over the period in question have been drawn up on alternative assumptions. The objective has been more to bring out some of the problems that arise in any such exercise rather than attempt to provide allegedly definitive answers, although, as will be evident below, a definite preference is given to the second of the two basic methods used here. Two main types of question arise. The first includes questions such as the extent to which the non-working time of individuals should be split into "pure" leisure and "non-market activities" (such as housework) and the corresponding wage rate that should be used for each insofar as this separation is thought to be important; the extent to which a distinction should be made between certain categories of the population that are non-active, such as between non-working housewives, students, retired persons, and the unemployed; the deduction that should be made from the total hours available in a day for the basic necessities such as sleeping and eating; and various other questions concerning the data that should be used for, say, wage rates, since these are only available for manufacturing industries in most countries, and exclude wages in services or agriculture.

In practice, however, it does not seem that different answers to these questions, or different degrees of disaggregation of the population and so on make any significant difference to the results. If the estimates for the U.S.A. made by Nordhaus and Tobin are replaced by estimates using their basic method and data but with a greater degree of aggregation, the difference in the results is negligible by comparison with the difference made by taking different views on the second type of question, namely those of a more basic conceptual and theoretical kind.

Before coming on to these questions, however, it may be appropriate here to indicate briefly how the former, more or less "bread-and-butter", questions have been answered in this paper, by outlining the main steps involved in the calculations. First a decision has to be made concerning what time is available per day for activities other than the basic necessities of sleeping and eating. Nordhaus and Tobin assumed that 7 hours per day were needed, on average, for sleeping, and that the time that needed to be spent in order to maintain an individual's "productive efficiency", as it were, including eating, personal care, and other activities involved in getting to and from work, amounted to about fourteen hours per day. Whilst these assumptions may be reasonable for the U.S.A. it is likely that the 'costs-of-work' time are relatively lower in other countries (e.g. the proportion of the population employed in giant cities is somewhat less), so that, on the basis of such fragmentary evidence as is available on the use of time in European countries, it has been assumed here that

the time spent on costs of work amount to 10 hours per week of total working time.[1] It has also been assumed here that eight hours per day are generally used for sleeping, irrespective of whether or not this is 'necessary' in any physiological sense. There is obviously room for much discussion concerning these assumptions, and more data on the use of time would be a help, but experimental calculations show that the results would not be affected by alternative plausible assumptions.

On the assumptions adopted in this study, the amount of leisure time available per week is then the daily time available of 16 hours (24 less 8) multiplied by 7, giving 112 hours per week, or 5824 hours per year.[2] For the active labour force a deduction then has to be made to allow for the 'costs of work' and 'personal care' time, as indicated above, and for the actual time worked per year. This has been based on data on working hours adjusted for changes in holidays.[3] Separate estimates have been made throughout for male and female employees.

For the inactive population no such deductions for work-time have to be made. However, allowance has been made for the rise over time in the proportion of the population over the age of 15 that is engaged in full-time or part-time education. For whether or not the time spent in educational activities is regarded as useful and productive and should hence be included in investment in the context of other studies, it is assumed here to be excluded from "leisure" treated as a consumption good. Hence leisure per head of the inactive population has been assumed to have declined in all countries by about 4 per cent, in line with the U.S.A. estimates by Nordhaus and Tobin.[4]

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(1) The actual computing procedure adopted was to apply a uniform ratio of 0.14 of working time to the actual working time per week in each country.

(2) Here the usual approximation is adopted, namely that there are 52 weeks in a year, when, in fact, there are 52.143 weeks in a year, (other than a leap year), so that the above procedure robs everybody of 1 day's leisure. It has been used, however, for purposes of simplifying comparisons between weekly total time available and hours of work which are invariably given on a weekly basis. Since what matters is the change in leisure over the period in question and not a 0.28% difference in the absolute level throughout, this approximation cannot affect the results.

(3) The estimates were supplied by A. Maddison

(4) In the U.S.A., according to the Nordhaus/Tobin estimates, the proportion of the non-active population other than housewives in the total non-active population rose, between 1954 and 1965, from 15.9 per cent to 23.9 per cent, leading to a fall in the hours per week that they spent on non-market activity of from 35.5 hours to 32.6 hours. The same trend (extrapolated forwards and backwards) as in the U.S.A. has been assumed here for all countries. Although the error involved here is certain to be insignificant, it is clearly one area - of many - in which the estimates could be improved if, in the light of the main results and conclusions of this study it was thought that much would be added to our knowledge of the growth of economic welfare by further refinements of this kind as distinct from those improvements that are suggested in the Conclusions.

Given the estimates of the average hours per annum of total available time (5824 hours per year), the next step is to deduct average working hours - distinguishing between male and female labour - including an allowance for holidays, to arrive at average hours of leisure. As indicated above no distinction has been made here, unlike in Nordhaus and Tobin, between non-market activities and all other uses of non-working time. The average wages per hour have then been used, again distinguishing between male and female labour, to arrive at a valuation of leisure time for the active population. For the terminal years (1950/52 and 1971/73) the current wage rates have been used to obtain a valuation of leisure at current prices, which is commensurate with G.N.P. in the terminal years at current prices. For the inactive population Nordhaus and Tobin used the same average wage as for the active population, but here two assumptions have been made, first, as in Nordhaus and Tobin, that the same wage as for the active population is appropriate, and secondly, that half the wage is appropriate.

The next step in the calculation is to deflate all the figures to constant prices of the base year, 1950/52. For G.N.P. this presents no problem, of course, and the available O.E.C.D. data have been used. But for the valuation of leisure at constant prices this presents a major problem concerning the choice of appropriate deflator. If it is assumed that there is no productivity increase in leisure then an hour of leisure in 1971/73 is the same as an hour of leisure in 1950/52, so that the current price valuation of leisure should simply be deflated by the wage rate used to value the hours of leisure in the terminal years. In other words, total leisure hours in 1971/73 would be valued at 1950/52 wage rates. If, however, leisure is credited with the same productivity increase as in normal employment the appropriate deflator is the price index of consumption goods. For since leisure has been valued in both terminal years by the current wage rate, if the consumption price index is used as a deflator this amounts, in effect, to raising the value of leisure during the period by the increase in the real wage (the current wage divided by the consumer price index). Another way of looking at it is to ask what the individual gets out of his leisure, and how this has changed. Since the current value is given, the amount that he can 'get' out of it can be regarded as having been reduced insofar as the consumer price level has risen.

The choice made between alternative assumptions concerning the productivity of leisure and hence the appropriate deflator can make an enormous difference to the results, given the manner in which the value of leisure dominates the total valuation of "Measurable Economic Welfare" (MEW) when this is defined to consist of GNP plus leisure. The relationships between the aggregates at current prices can be seen in Table 2.1 below. It can be seen that in all countries the current value of leisure was much greater than that of G.N.P. in the base year.

The relationships between the two components of MEW at constant prices depends on the choice of deflator for leisure. At this stage, therefore, it is

necessary to introduce the second type of issue - namely the important conceptual issues - that arise in the estimates of MEW. There are two main such issues, of which the first is directly relevant to the deflator to be used for leisure. This concerns the extent to which leisure time should be credited with a

Table 2.1 G.N.P., Value of Leisure, and Measurable Economic Welfare (MEW), at current prices, 1950/52

(billions of national currency)

Country	G.N.P.	Leisure	Measurable Economic Welfare	Ratio Leisure to MEW
Austria	67.52	158.05	225.57	0.700
Belgium	392. 6	482.87	875.23	0.552
Canada	21.03	41.59	62.67	0.664
Denmark	23.05	37.05	60.10	0.616
Finland	7.14	13.96	20.51	0.662
France	122.41	125.55	247.5o	0.506
Germany	117.13	182.44	299.57	0.609
Italy	9,907	20,215	30,122	0.671
Japan	5,183	10,997	16,180	0.680
Norway	18.00	29.02	47.02	0.617
Sweden	34.26	58.04	92.30	0.629
U.K.	14.60	21.14	35.74	0.591
U.S.A.	322.24	573.2	895.31	0.640

productivity increase in the same way as the time spent in work is credited with a productivity increase (and hence reflected in rising G.N.P. per man per unit of time at constant prices). With the Nordhaus/Tobin method, if it is assumed that leisure time should be credited with as much productivity increase as labour time the growth rates of measurable economic welfare (MEW) are about twice as great as if it it is assumed that there is no productivity increase in leisure time. The theoretical implications of the alternative assumptions are set out more fully later on. The quantitative reason why the choice of assumption makes such a big difference to the result is as follows.

The essence of the Nordhaus/Tobin method - as indicated below - is to add to the value of G.N.P., as conventionally measured, the whole of the value of leisure time in the years being compared. Since, in the absence of any allowance for an increase in the productivity of leisure, the change in total leisure (measured in hours) in the countries covered over the period in question has been very small, this would amount to adding to G.N.P. a relatively large absolute amount that has generally grown far less rapidly than G.N.P. For example, in the U.S.A. over the period in question (1950/52 to 1971/73), before allowing for the population increase (about 35 per cent) G.N.P. rose by 111% at constant prices, whereas the total hours of leisure, as estimated here, rose by only 33%. And since in the base year, the value of the total leisure hours was, at $573 billion, greater than GNP ($322 billion) the effect of adding leisure to

GNP to arrive at total MEW is to yield a much slower growth rate of GNP plus leisure.

Now the growth of GNP alone is not very different from the rise in the real wage (barring any drastic change in the share of labour income in total national income). Hence, if the productivity of leisure were assumed to rise at the same rate as that of labour time, total MEW would rise closely in line with that GNP, the only divergence being caused by changes in the share of wages in GNP and different rates of growth of leisure and labour input for male and female labour. In other words, if no productivity increase is attributed to leisure, the growth of MEW will inevitably be much slower than that of GNP on account of the addition to GNP of a relatively slow growing component of a relatively large absolute amount, whereas if leisure is credited with a rise in productivity equal to the rise in the real wage, the growth of MEW will not differ much from that of GNP.

The reason for the very slow relative growth of leisure measured in units such as hours p.a. in all countries, in spite of the fall in working hours and increase in holidays, is as follows. The fall in working hours and the increases in holidays affect only the leisure hours of the active labour force. The non-active population does not gain any extra leisure on that account and since, in all countries, even the inactive population aged 15 and above is between one third and one half of the total population aged 15 and above this would drag down the average increase in leisure expressed per head of total population or population aged 15 and above.

It is true that the ratio of active to non-active population (aged 15 and above) has fallen in all except three countries (Belgium, Sweden and the U.K.), and since the non-active population have more leisure time than the active population, this switch will have tended to raise the overall leisure ratio. But, on the other hand, it has been assumed that the leisure available to the non-active population has fallen slightly over the period in question (by about 4 per cent) on account of the changed composition of the non-active population, namely a greater proportion have stayed on in education beyond the age of 15. (see page 11 and page 11 footnote 4 above). These two effects seem to have roughly cancelled each other out.

The net result, therefore, is that the weighted average of the rise in leisure per active population and the fall in leisure per inactive population has remained very stable, as can be seen in Table 2.2 below. Even in Norway, Sweden, Denmark and Germany, where the rise in the annual leisure time of the active population has been greatest, the increase in leisure per total population (aged 15 and above) has been only a few percentage points. For the average of the thirteen countries covered, the leisure per active (male) population rose by only 11.3 per cent to begin with, which represents a growth rate of only one half of 1 percent per annum. For the active female population the rise was even slower (reflecting partly the extent of part-time female labour which did not gain so much from longer holidays and so on). Hence, even

Table 2.2 Change in Leisure Per Head of Active and Inactive Population
(Indices of Hours of Leisure Per Annum; 1971-73 with 1950/52 = 100)(a)

Country	(1) Leisure per Active Male	(2) Leisure per Active Female	(3) Leisure Per Total Population Aged 15 and Over(b)	(4) Ratio Population Aged 15 and above to Total Population	(5) Leisure per Head of Total Population(c)
Austria	106.8	105.3	101.7	98.6	100.3
Belgium	114.5	111.0	102.7	97.2	99.9
Canada	114.8	104.3	99.4	101.9	101.3
Denmark	119.2	114.5	106.4	104.7	111.3
Finland	110.8	108.3	104.7	108.3	113.4
France	104.0	103.1	98.9	98.9	97.8
Germany	116.0	112.1	106.9	97.7	104.4
Italy	112.4	109.6	108.5	99.3	102.8
Japan	103.9	102.9	101.3	117.2	118.7
Norway	115.0	111.5	104.9	100.5	105.4
Sweden	122.2	111.6	104.5	103.6	108.3
U.K.	106.0	103.3	100.1	97.6	97.8
U.S.A.	100.9	100.7	97.9	100.4	98.2
Average (Index)	111.3	107.6	102.4	101.9	104.5
Average (Annual Growth Rate)	0.5%	0.3%	0.1%	0.08%	0.2%

(a) The indices of leisure hours shown here are not those actually used for the general calculation which, as described in the text, involves valuing separately the leisure hours of male and female labour, in absolute amounts, in the terminal years. The resulting combined index of leisure does not, however, significantly differ from a crude index of total leisure in terms of hours, since, as can be seen from column (1) and (2) above, the movement in leisure for males and females has not differed greatly over the 21 year period in question in most countries.

(b) The index of leisure per inactive population (aged 15 and above) has been assumed to be 96.6 in all countries, corresponding to the trend in this item in the U.S.A. over part of the period in question and that reflects an increase in education enrolment ratios that is common to most countries.

(c) This column is, of course, the product of columns (3) and (4). If L = leisure, N = population aged 15 and above and P = total population, $\frac{L}{P}$ (col:5) = $\frac{L}{N}$ (col:3) multiplied by $\frac{N}{P}$ (col:4), whether these are expressed in ratios of any given years or as indices of ratios as in this table.

without the above mentioned dampening impact of the existence of a large non-active population whose leisure would not, anyway, increase at all on account of shorter working hours and longer holidays for the active population, the overall rise in leisure for the active population would not, by itself have had any significant impact on measured economic welfare. When account is then taken of the inactive population, the overall rise in leisure per head of population aged 15 and above, at 0.1 per cent per annum is clearly trifling.

The last two columns of Table 2.2 show how the change in leisure per head of population aged 15 and above has been reflected in the change in leisure per head of the whole population. Here, the change in the age structure of the population has played some part, notably in Japan and, to a lesser extent, Finland, where there has been a relatively large rise in the proportion of the total population aged 15 and above. As a result, in both these countries, the rise in leisure per head of total population has been greatest, but even in the case of Japan, which heads the list, the annual growth rate of leisure per head of total population has still been only 0.8 per cent per annum, so that again, taking it by itself, it could hardly fail to reduce the growth of Measurable Economic Welfare when this is defined to consist of G.N.P. plus leisure, in the absence of special assumptions concerning the appropriate transition from leisure measured crudely in hours worked to leisure measured at constant prices.

The question of the appropriate assumption to be made for converting hours of leisure in the terminal years into the value of leisure at constant prices is, therefore a crucial one, and raises the above-mentioned issue or what productivity assumption should be made concerning the extent to which an hour of leisure in 1971/73 should be regarded as equivalent to an hour of leisure in 1950/52 (the "pessimistic" productivity assumption, to use the Nordhaus/Tobin expression) or as representing a greater amount of "effective" leisure (the "optimistic" assumption) on account of a productivity increase in the use of leisure time.

As between the two extreme assumptions concerning the imputation of a productivity increase to leisure time there does not appear to be any firm basis for a definitive conclusion. In their original study, Nordhaus and Tobin estimated MEW on both assumptions and also on the intermediate assumption that the productivity of leisure devoted to 'non-market' activities had grown at the same rate as the real wage, and that the productivity of the remaining leisure had remained constant. In this study no distinction has been made between these

two components of leisure, largely for the reason given above (namely that, apart from the scope for discriminating between them with respect to the productivity assumption, it made a negligible difference to the results) and partly because the Nordhaus/Tobin intermediate assumption is, in a sense, just as extreme an assumption as the two others. For it is a combination of the two extreme assumptions - one extreme for 'non-market' activities and the other extreme for 'pure' leisure - and there seems to be no more basis for this particular set of assumptions than for, say, simply taking the mid-point between the two estimates shown above.

Furthermore, as pointed out in the later chapter discussing the overall results, the ranking of countries is little affected even by important differences in methods and assumptions when these are applied uniformly to all countries. Further refinements would be more useful if they take the form of developing suitable data on the way in which leisure time is actually spent and on the facilities available for the use of leisure time which would enable one to discriminate between countries with respect to choice of assumption rather than more variants on theoretical alternatives which have to be uniformly applied, without any possibility of verifying their empirical foundations in individual countries.

A more formal way of looking at the whole question - and one that will also be useful for purposes of the subsequent discussion of the main alternative method - is in the context of the traditional analysis of the individual's supply of labour referred to at the beginning of this chapter. This is as follows. The individual can be seen as having a certain amount of time available (after setting aside some minimum for sleeping and eating) which, following the Nordhaus/Tobin notation, may be denoted by R. He can devote this either to work time (W) or to leisure time (L).[1] For every extra hour that he devotes to leisure he sacrifices an extra hour's wages, and it is obvious that, if he optimises his allocation of time he would only sacrifice leisure for gainful employment up to the point where the marginal utility to him of the marginal unit of leisure time was equal to the marginal utility to him of the extra income that he would obtain by making the sacrifice. Since the diagrammatic presentation of the argument is extremely useful for purposes of subsequent discussion of alternative statistical procedures it is set out below.

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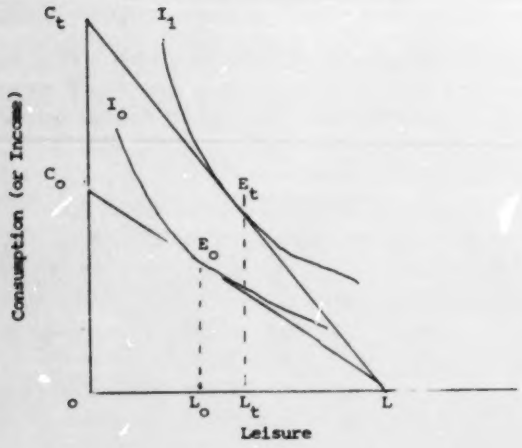
(1) Actually, as mentioned already, Nordhaus and Tobin distinguish between pure leisure (L) and 'non-market' activity, such as housework, (H), but this distinction is not necessary for purposes of the exposition here of the basic principles, nor has it been adopted in the calculations made here.

Diagram 1



Mathematically, since the individual may obtain some income from other sources (e..g. capital, or social security transfer payments, or other individuals such as members of his family)it is preferable to regard the supplier of labour input as being governed by the utility function

$$U = U(w,y)$$

where: w = supply of labour input (i.e. sacrifice of leisure)

and y = income.

But the fact that he may have sources of income other than that obtained from employment makes no difference to the marginal conditions for optimisation set out below in terms of the ratios of the marginal utilities of extra income and wage rates,although it does affect the optimum level of work at which these conditions are satisfied. The receipt of income other than from work would have to be represented on the above diagram by an upward parallel shift in the constraint, which obviously moves the tangency point to the right - i.e. to a point where he supplies less labour (1).

Another simplifying assumption adopted here for purposes of exposition is that the individual can, in effect, choose his hours of labour. This is obviously unrealistic in the short run. Similarly, no allowance is made for other discontinuities in the trade-off of leisure against income, such as those that are due to changes in marginal tax rates or transfer benefits. Such considerations, whilst important for other problems, do not affect the analysis

(1) Assuming leisure is not an "inferior" good.

here.[1] Given these simplifications, the optimisation rules can be derived in the usual way from maximising the Lagrangian expression

$$U(w,y) - (wp_w - y) = \max,$$

where p_w = the price of labour (i.e. the wage rate)

So that $\frac{\delta U}{\delta w} - \lambda p_w = 0$ and $\frac{\delta U}{\delta y} + \lambda = 0$

and equating the values of the Lagrangian multiplier,

$$\lambda = \frac{\delta U/\delta w}{p_w} = - \frac{\delta U}{\delta y},$$

so that the individual optimises when $p_w = - \frac{\delta U/\delta w}{\delta U/\delta y}$

i.e. where the wage rate is equal to the ratio of the marginal disutility of work to the marginal utility of income.

From the diagram it is obvious that when the wage rate corresponds to the slope of LC_o he will supply L_o of work and retain L_oL of leisure and at the higher wage rate given by the slope LC_t he will retain only LL_t of leisure. It is possible, of course, that, since leisure is assumed to be a non-inferior good, the higher wage rate will induce him to supply less work since the income effect of the higher income, which would, cet.par., induce him to work less, might offset the substitution effect of the higher opportunity cost to him of extra leisure. This is the well-known case of a backward sloping supply curve of labour.

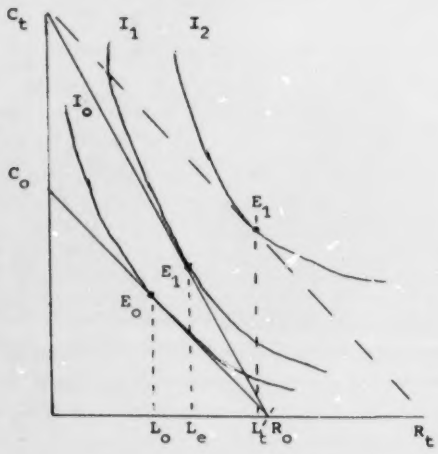
The essence of the Nordhaus/Tobin method of valuing leisure can be seen, in Diagram 1 above, as valuing the <u>whole</u> of the leisure time available at the base year, o, at the prevailing wage rate, which corresponds to converting L_o into its equivalent consumption, C_o by projecting the equilibrium point E_o to the consumption axis simply along the slope of the constraint line at that point, and similarly for the value of leisure at time t.

However, as Nordhaus and Tobin point out, this procedure implies that when the productivity of labour increases, as expressed through the higher wage rate (steeper slope of the trade-off), there is no corresponding increase in the productivity of time spent in leisure activities. But there may well be technical progress in the use of leisure time. For example, the increased ownership of domestic appliances, such as dishwashers or washing machines, may cut the time needed for such activities; the greater mobility provided by automobiles may make it possible to extract more time for actually carrying out leisure activities, such as recreational activities, per total time not spent working; or the use of tape recorders and so on may increase the amount of "music listening" that may be obtained for a given amount of non-working time by comparison with the old days

(1) For a recent sophisticated treatment of the effect of allowing for such considerations see G.Hanoch and M. Honig <u>The Effect of Social Security Benefits on Labour Supply</u>, Discussion Paper No.11 of The National Insurance Institute, Jerusalem, Bureau of Research and Planning, May 1976.

when this would have meant travelling to listen to live performances.[1] Insofar as this is the case, then for any given moment of total time available in natural units of days and hours the total time of "effective leisure" will have increased. This would have to be represented on a diagram such as that above by "stretching" the horizontal axis. For example, if the productivity of leisure time had increased exactly as much as the real wage (i.e. the productivity of work time), the constraint line would shift out parallel to the base year line. Nordhaus and Tobin present the alternatives in the following diagram (in which the notation of Diagram 1 however has been retained)

Diagram 2



Effective Leisure

If it is assumed that there is no productivity increase in leisure - what Nordhaus and Tobin call the "pessimistic" assumption - then, as in Diagram 1 above, the individual only increases his welfare insofar as the real wage rises and he takes advantage of the change to move to higher indifference curve, I_1 where the gain in welfare is measured by the vertical distance from E_1 down to the original budget line (R_oC_o) or from E_o to the new budget line R_oC_t. If, on the other hand, the productivity of leisure is assumed to have risen in line with the real wage, the whole budget line must shift out parallel to the

(1) The discussion in the OECD internal document Social Indicators Development Programme Common Development Effort No.5, "Time and Leisure" (SME/S1/CDE5/76.8) of the distinction between the input of leisure time and the output of a contribution to individual well-being, as well as of the difficulties of drawing a sharp distinction between working time and leisure time from the point of view of their direct contribution to well-being, has a clear and important bearing on the issue raised here as well as on other simplifying assumptions adopted here.

original budget line.[1] For the trade-off between effective leisure (i.e. what one can do with leisure time) and consumption will have remained unchanged. An hour of natural time can get as much more of effective leisure as of consumption goods (via earning more income). Hence, as Nordhaus and Tobin put it, "The real wage per effective hour is unchanged, although it has increased in terms of natural hours". The optimum point E_1 is really E_1^* in terms of effective leisure so that the gain in welfare should be measured as the vertical distance from E_1^* to the original budget line.

Whilst the theory clarifies the issues involved in choosing alternative deflators for the value of leisure, it cannot, of course, tell us which particular assumptions are more realistic. As indicated already, this would require some knowledge of the use of leisure time and the existence of leisure facilities. Hence, in this study estimates have been made on the basis of both assumptions.

Table 2.3 below shows the effect of combining with the growth of GNP the two alternative estimates of the growth of leisure.[2] It will be seen that on a per capita basis, without any productivity increase attributed to leisure, the annual growth of leisure was, on the average, only 0.21 per cent per annum, whereas if leisure is credited with the same growth as the real wage it is 4.34 per cent per annum, by comparison with a GNP growth rate of 4.00 per cent per annum. If MEW is defined as the sum of the growth rates of leisure plus GNP, therefore, the growth rate of MEW (measurable economic welfare) for the average of the thirteen countries covered is only 2.02 per cent per annum on the first assumption and 4.17 per cent on the second assumption.

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(1) The productivity of labour in the present context is simply GNP per unit of labour input without making any allowance for the extra capital equipment involved. The relationship between GNP and the real wage, therefore, only changes significantly insofar as there is a major change in the labour force and/or the share of wage income in total income. When GNP per head of population is used, its relationship to the real wage will also be affected, of course, by changes in the proportion of the population that is in the labour force. By comparison with the rise in output per head over the period in question these variables have played a minor role.

(2) The growth rates of MEW relative to the growth of leisure and GNP will depend on the weights of leisure to GNP, which vary from country to country. The actual computation of the growth of MEW was based on the absolute values (at constant prices) of MEW obtained by addition of GNP and leisure, in the terminal years, at 1950/52 prices.

Table 2.3 Comparison of growth rates of Measurable Economic Welfare by Nordhaus/Tobin method, under alternative assumptions concerning the productivity increase in leisure time: 1950/52 to 1971/73

(Annual average compound growth rates per head)

	(1)	(2)	(3)	(4)	(5)
Country	Leisure[1]		G.N.P.	"Measurable Economic Welfare" (MEW)	
	(a) No productivity increase in leisure	(b) Productivity of leisure rises with real wage		(a) (corresponding to Col:(1))	(b) (corresponding to Col:(2))
Austria	0.05	3.98	4.88	2.02	4.25
Belgium	0.04	5.00	3.55	1.91	4.39
Canada	0.10	3.26	2.43	0.99	2.95
Denmark	0.55	5.72	3.51	1.89	4.50
Finland	0.22	3.33	4.29	1.99	3.66
France	- 0.10	3.45	4.27	2.62	3.85
Germany	0.18	5.66	4.63	2.39	5.23
Italy	0.21	4.66	4.57	2.07	4.61
Japan	0.87	7.15	8.76	4.80	7.67
Norway	0.30	4.06	3.32	1.68	3.77
Sweden	0.45	4.99	3.18	1.62	4.36
U.K.	- 0.04	3.36	2.35	1.06	2.95
U.S.A.	- 0.08	1.75	2.16	1.19	1.95
Average	0.21	4.34	4.00	2.02	4.17

(1) The growth rates of leisure shown here will differ slightly from those used in Table 2.2. above, which were in crude units of total hours of leisure, being based here on separate valuations of leisure for males and females at their corresponding wage rates and then deflated by wage rate indices separately for the "pessimistic" assumption (a), and, in aggregate, by the consumer price index for the "optimistic" assumption (b).

As between the various countries, the slight fall in leisure under the "pessimistic" assumption, in France, the U.K. and the U.S.A. reflects the combination of only a slight rise in leisure per head of the active population and the large weight of the inactive population whose leisure has been assumed to have declined slightly. And, as can be seen from Table 2.2, the relatively rapid rise in leisure per head of total population in Table 2.3 above, in Japan, reflects chiefly the changed age structure in Japan, not any exceptionally sharp rise in leisure per head of the active population. But the net result is that Japan still leads the other countries in terms of annual growth rate of leisure, and the other three countries show the slowest increases. Since Japan also leads in terms of G.N.P. growth rates, and two of the other three countries (the U.K. and the U.S.A.) had the slowest rates of growth of G.N.P. it is inevitable - quite apart from the general considerations mentioned above - that the ranking of these countries in terms of total MEW is not affected. Whichever of the two main productivity assumptions is adopted for leisure, Japan still has the fastest growth of MEW, and the U.K. and the U.S.A. have the slowest growth rates.

More generally, although the whole overall level of all the countries' growth rates is substantially affected, there are only slight changes in the ranking of the other countries. The final growth rates of MEW will be the resultant of the relative growth rates of leisure and GNP in each country and the weight of leisure in GNP (shown in Table 2.1 above).[1] The rankings of the countries on alternative bases are given in Table 2.4 below. As can be seen from the table, there is a fairly close correlation between the ranking of countries according to GNP growth rates and their ranking according to MEW with either of the two assumptions concerning changes in the productivity of leisure. Japan, Italy, Germany and France (except on MEW(b)) stay among the leaders and the U.K. and the U.S.A., exhibit the slowest growth rates however it is measured. One of the major exceptions is Austria, whose growth rate ranking moves down several places on either of the MEW measures, by comparison with its GNP growth ranking. This is the combined effect of a comparatively high weight of leisure

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(1) The relationship between the growth rates of MEW on the one hand, (see Table 2.3) and, on the other hand, (i) the weight of leisure in total base year MEW and (ii) the ratios of the growth of leisure to the growth of GNP is as follows, where l = leisure, y = GNP, S = share of leisure in total MEW, and G = growth rates,

$$G_{MEW} = S_l(G_l - G_y) + G_y$$

so $G_{MEW} > G_y$ when $G_l > G_y$, but the proportionate difference depends, of course, on S_l.

Table 2.4. Ranking of countries' growth rates of GNP and Measurable Economic Welfare (MEW), with Nordhaus/Tobin method, under alternative assumptions concerning the productivity of leisure time.

Country	GNP	MEW	
		(a) No productivity increase in leisure	(b) productivity of leisure rises with real wages
Austria	2	5	7
Belgium	7	7	5
Canada	11	13	11
Denmark	8	8	4
Finland	5	6	10
France	6	2	8
Germany	3	3	2
Italy	4	4	3
Japan	1	1	1
Norway	9	9	9
Sweden	10	10	6
U.K.	12	12	12
U.S.A.	13	11	13

in total base year MEW and of one of the slowest growth rates of leisure, compared to its GNP, of all the countries covered.

The combined effect of the initial weight of leisure in total MEW and the alternative assumptions concerning the productivity growth of leisure on the rankings can also be seen in the table 2.4. For example, France ranks very low in the growth rate of leisure under the pessimistic assumption (see Table 2.2), and 8th in terms of the ratio of the leisure growth rate (under this assumption) to her GNP growth rate, but has relatively low weight of leisure in total base year MEW, and so the French ranking in terms of MEW(a) is actually higher than in terms of GNP. By contrast, Germany has a higher ranking than France in terms of leisure growth, but the fact that this is still much below her GNP growth rate combined with the fact that the weight of leisure in total MEW is greater in Germany than in France means that the German ranking actually falls when moving from GNP growth rates to MEW growth rates (under the pessimistic assumption).

However, since the "optimistic" assumption concerning the productivity increase in leisure greatly raises the growth rate of leisure in all countries, a low weight of leisure in the total MEW is no longer a general advantage, for, under the optimistic assumption the growth rate of leisure in many countries is faster than the growth rate of GNP. As can be seen in the third column of Table 2.3 this is the case in seven out of the thirteen countries covered, and in all these countries with the exception of Canada, their ranking on MEW(b) is higher

than on G.N.P. Nevertheless, although there are various minor changes in ranking and one or two major changes, the general picture is still one of a close correlation between the alternative measures.

As explained above, such a result is almost unavoidable given the basic logic of the Nordhaus and Tobin method. For under either of the two extreme assumptions, given the relatively slow growth of leisure measured simply in terms of hours, the Nordhaus/Tobin method means that either the growth of MEW is much lower than that of G.N.P. by a roughly similar amount in all countries (with the "pessimistic" assumption) or that it is very close to the actual G.N.P. growth rate (with the optimistic assumption). This raises the question of whether there is much point in making this sort of adjustment at all - a question that will be discussed more fully in the concluding chapter. Furthermore it happens that not merely may the Nordhaus/Tobin method add little to our knowledge of the growth of economic welfare but it may also be theoretically highly debatable. The reason for this will emerge from an examination, in the next chapter, of the alternative method proposed by Professor Dan Usher and from his comments on the Nordhaus/Tobin method.(1)

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(1) These comments are made in the volume edited by M. Moss The Measurement of Economic and Social Performance, National Bureau of Economic Research, Studies in Income and Wealth, Vol.38, New York and London, 1973, which reproduces the Nordhaus and Tobin paper as well as important comments by others, and further developments, in reply, by Nordhaus and Tobin.

Chapter 3. Economic Welfare allowing for changes in leisure: II. The Usher Method

(i) The theory

The key feature of the Usher criticism of the Nordhaus/Tobin method is that "We make a distinction among good things between those like cars, food, and clothing that we treat as part of income and those like leisure, friendship, or the love of God that we exclude from income. Normally when we speak of growth, we consider only the growth of what we choose to call income and we suppose that good things not included in income remain invariant, thus preserving the analogy between real incomes over time and the spectrum of income at a moment of time".(1) The point of Usher's criticism is that if we were to add to "economic welfare" all other aspects of the "environment" (in the widest sense of the word) in which we live we would have to add other possibly very large absolute amounts, that are generally supposed to remain more or less "invariant", and thereby reduce the growth rate further (unless a productivity increase in line with the real wage increase were also attributed to them all, in which case we are back with a growth rate of MEW that hardly differs from the growth of G.N.P.). As Usher puts it "...the Nordhaus and Tobin imputation opens the measure of economic growth to more speculation than most of us would find acceptable. For, if new commodities are to be introduced, why stop at leisure? Why not reduce the growth rate still further by imputing for friendship, or the love of God?"(2)

Usher proposes that the oorrect procedure in comparing leisure adjusted incomes in years 0 and t is merely to make an imputation for the difference between leisure in the terminal years, which should be added (or subtracted as the case may be) to G.N.P. of year t, to arrive at an adjusted G.N.P. for that year only (if year 0 is the base year) rather than to add the whole of leisure in both of the terminal years to the G.N.P. of each of those years. He argues that "The rationale of the alternative (i.e. Usher) method is based on an analogy between real incomes in different years and the spectrum of money incomes in some given base year. If in 1961, Mr. A earns $72 per day and Mr. B earns $216 per day, we would say that Mr. B has 3 times the income of Mr. A. We might even be prepared to say that the ratio of their incomes is larger than 3 if Mr. B works less than Mr. A, but we would certainly not say that it is only 2.1 because both parties enjoy a substantial amount of leisure".(3)

In other words if one is comparing one's income with somebody else, say Mr. X, one might want to take account of the difference in hours of work and hence of leisure, but one would not want to add to incomes the total leisure time

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(1) D. Usher in M. Moss (ed.) op. cit. page 541.

(2) ibid., page 544. It is important for purposes of the subsequent argument developed later in this chapter to note that Usher assumes that such an imputation must necessarily reduce the growth rate, which means that he is assuming that these other things would have to be presumed to increase relatively slowly, if at all.

(3) ibid., page 541.

enjoyed by oneself and Mr. X. For example, in considering whether to change jobs, one might adjust the difference in salary involved for one's estimate of the disutility of having to work longer hours or having a less attractive physical surroundings or access to cultural facilities, but one would not proceed to try to make valuations of the total welfare obtained from all these "environmental" factors in both situations and then add them to the two alternative salaries involved in order to arrive at a final overall comparison.

However, whilst this appears to be a persuasive criticism, it is perhaps still not decisive from a theoretical point of view. There are two distinct issues. First, whether the item should be included at all under the concept of "economic" welfare, as distinct from non-economic welfare, and secondly, if it is to be included, how should it be valued. As regards the first issue, the fact that the inclusion of a certain item into the concept of "measurable economic welfare" slows down the growth rate because it is a relatively stable item is not a sufficient reason for excluding it and should not be confused with the real issue, namely whether the itemsin question can be regarded as being "economic" as distinct from non-economic ingredients of total welfare. If, for example, the practical problems of imputing a value to the services provided by consumer durables, or publicly owned capital assets such as hospitals or schools, could be overcome, it is conceivable that, over certain periods,the total stock of these items could be constant (or fall) so that an imputation for the total value of their services would slow down the growth rate of MEW. But this would be a perfectly legitimate result and would accurately reflect the fact that the society in question had chosen to use its output in ways other than adding to the stock of these capital assets. Similarly, if society chooses to sacrifice leisure or opportunities to add to leisure in order to increase output above what would otherwise be the case, this does not necessarily disqualify leisure from being regarded as a component of MEW. Usher's argument above the love of God is not analogous since society may not have a choice between this component of its welfare and the use of its resources for purposes of maintaining or increasing output as conventionally measured, notwithstanding the well-known conflict between God and Mammon.

And as for Usher's point that,in a comparison of income between two individuals at any moment of time (or the same individual over time), one would only add an imputation to one of the incomes for the <u>difference</u> in leisure in order to arrive at the ratio of the incomes instead of adding the whole value of each person's leisure to both incomes, the above analogy with consumer durables again applies. For it is perfectly reasonable for the two individuals to add to their money incomes an imputation for the total value of the services they derive from consumer durables, their houses and public facilities and the like in the neighbourhood. The reason why, on the other hand, they would not - even if they accepted the Usher argument - impute a value to the love of God or the pure air or beautiful scenery that they might feel they enjoy, is not that they regard this as something roughly invariant and equal for both of them (or unquantifiable);

it is the same as the reason why they would not even apply the Usher method, or any other method, to elements in the external environment of their nature, namely that - as pointed out above - they do not regard this as something that is, in principle, a part of economic welfare and that can be brought into relationship with the measuring rod of money and that, furthermore, can be traded off against economic output as normally defined.

In other words, the issue is not whether the item under consideration is relatively stable or not, nor even whether MEW in two different situations should be evaluated by adding its total amount in each situation or, as in Usher's method, by valuing only the difference between the two amounts and adding this to the income of one situation only. If the item in question is regarded as being part of "economic" welfare - which is basically a value judgement, although facts such as whether it can be, or is, traded off against economic output, may be decisive or at least relevant - then some allowance should be made for it in principle. The only question then is by what method should one make the allowance.

But although the relative size or stability of any particular item has nothing to do with the issue of principle concerning whether it should be included under economic welfare, it does happen to have a major bearing on the question of how one should make the imputation and, as argued below, it would appear that the Nordhaus/Tobin method is wrong and that Usher's method may well be preferable, if not for the reason he gives. As already pointed out (see also page (20) above) the Nordhaus/Tobin method values the whole of leisure at its marginal value (as given by the wage rate optimum condition). This is, of course, the conventional method of valuing all categories of goods and services. For example, the value of bread is the volume of bread valued at its prices and this is the price it fetches at the margin. Consumers' surplus is ignored. In the present case, as leisure is reduced, its marginal utility will rise so that the total welfare valuation of total leisure, including consumers' surplus,may be incomparably greater than the estimate obtained by multiplying the whole of leisure time by its marginal utility equivalent (the wage rate) at the point when large amounts of leisure are enjoyed. Put another way, an individual who is deprived of his total leisure would find life completely intolerable even if compensated by a payment equal to the leisure hours valued by the value he attaches to marginal unit, (not to mention the fact that many of the consumption goods that he buys would serve no purpose if he did not have any leisure time at all in which to enjoy them).

In other words, even if - to return to the earlier discussion - leisure had been increasing much faster than G.N.P., so that the Nordhaus/Tobin method raised the growth of MEW above that of G.N.P., it would still raise the familiar consumer surplus problem. Of course it is customary to value all aggregate flows in national income at the prevailing prices, which, at best, measure marginal utilities, and exclude consumer surplus. On the other hand, it is equally customary in the context of cost-benefit analyses of large investment projects, for example, to attempt to approximate to the additional consumers' (and

producers') surplus accruing to the project by using some combination of the prices prevailing before the project is in operation and the prices that are expected to prevail after it is in operation.

Now it could be argued that, in the case of the valuation of total food expenditures in the national accounts, this is the sum of a host of small items for which the price is a good approximation, in each case, to the satisfaction obtained by the consumers. Hence, if total leisure were composed of a large number of components, each of which was valued at its corresponding price, the method might be less objectionable. Of course, this raises a number of complex issues. The concept of consumers' surplus is much in dispute to begin with; there are various ways in which it can be interpreted; in the context of the present problem account would have to be taken of the fact that, whilst leisure may be divisible, there is a sense in which different parts of leisure cannot be substituted for each other (i.e. one could not simply work 40 hours per week by simply working (sacrifice leisure) between the hours of 10.00 p.m. and 11.00 p.m. and conserve for oneself more hours between 9.00 a.m. and 10.00 a.m.

But there seems a general presumption, that would be shared even by those who are sympathetic to the recent attempts to rehabilitate consumers' surplus, to the effect that the use of a single marginal valuation to evaluate the <u>total</u> leisure available to individuals does violence to the usual assumption made when using prices to obtain valuations of other items in the national accounts, namely that they are good indicators of satisfactions when one is concerned only with small marginal adjustments. In any case, it would be out of place in an essentially quantitative study, such as this, to pursue these questions further; the results are given on both the Nordhaus/Tobin method and the alternative Usher method.

The Usher method is completely free from the objection to the Nordhaus/Tobin method just outlined since his method requires that the imputation is only made for the (relatively) small differences in leisure between the situations being compared, and is then added only to income in one of the situations. The difference between the two approaches has been clearly set out by Usher in a diagram from which the following simplified version has been derived.(1)

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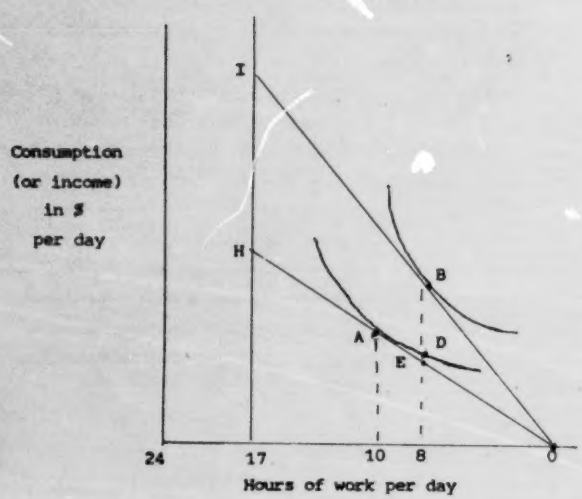
(1) <u>ibid</u>. page 543.

Diagram 3



In Diagram 3 above, the two straight lines through the point O correspond to the two real wage rates prevailing in each period, and A and B indicate the individual's optimum position at each wage rate. At A he works 10 hours per day, leaving himself 7 hours of leisure (on the Nordhaus/Tobin assumption of 7 hours "sleeping time"), and at B he works only 8 hours per day (the income effect of being richer more than outweighing the substitution effect). Nordhaus and Tobin would evaluate the difference in leisure as equal to the vertical distance IH, since the value of leisure in each period is given by the projection on to the vertical consumption axis of the total leisure at each period valued by the wage rate. Usher,however, would only convert into its utility equivalent the difference in leisure hours - namely 2 hours (10 less 8) - at the wage rate prevailing in the two years.

As he points out this is only an approximation to the exact difference in the utility equivalent, in terms of consumption, of the shift round the indifference curve indicated by the difference in leisure. The exact utility equivalent would be the distance BD, since D is equivalent to A in terms of utility to the consumer, whereas the use of the wage rate as a proxy for an exact knowledge of the marginal rate of substitution between leisure and consumption over the relevant range means that Usher would measure the difference in welfare as equal to the distance BE. In the case illustrated above, the error involved is very small compared to the error involved - if the earlier argument concerning the applicability of the marginal utility to the whole of leisure is accepted - in valuing the whole of leisure at the levels I and H.

In other words, the Usher method amounts to estimating the difference in consumption that would leave the individual on the same indifference curve if he

were to give up (or get) the difference in leisure between the two situations. And, as is the normal practice in national income evaluations, it is assumed that, over reasonably small ranges, this will be approximated by the price of the good in question since this should be equal to the marginal rates of substitution of the goods (in this case leisure and consumption being the goods, and the wage rate their relative price).

Formally, Usher imputes for changes in leisure by assuming that the representative consumer has a utility function $U[C(t),L(t)]$ where $C(t)$ is the value in the year t of real income as conventionally measured, and $L(t)$ is the amount of leisure in the year t.(1) If then, the base year is, say, 1950, define $\hat{C}(t)$ as the value of real income in year t that would make the consumer as well off in year t as he is with his actual year t levels of consumption and leisure if, however, he had 1950's leisure instead of year t's leisure. Since his actual year t utility is equal to $U[C(t),L(t)]$, the value of $\hat{C}$ is defined by the equation:-

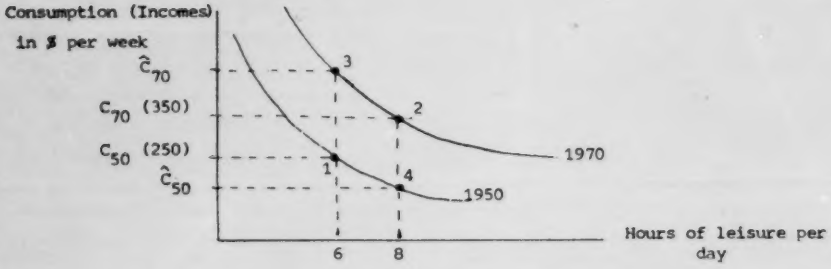
$$U[\hat{C}(t),L(1950)] = U[C(t),L(t)]$$

Corresponding to the verbal argument used above concerning the approximation to the marginal rate of substitution by means of the wage rate, as is common practice, it can be shown by expanding $U[\hat{C}(t),L(1950)]$ in a Taylor series around $U[\hat{C}(t),L(t))]$ that

$$\hat{C}(t) \simeq C(t) + \text{wage}\ (t)\ [L(t) - L(1950)]$$

The procedure can be illustrated in the following diagram, which is a simplified form of Diagram 3 above,

Diagram 4



In the above diagram the two actual situations are at points 1 and 2. Assuming that all incomes are at constant prices (1950), point 1 corresponds to the actual leisure and consumption of 1950, namely 6 hours leisure and C_{50}, of consumption (or income), and point 2 corresponds to the actual leisure and

(1) See D. Usher in M. Moss (ed.) op. cit., page 541.

consumption of 1970, namely 8 hours leisure and C_{70}, £350 consumption. What is required is to convert C_{70} into $\hat{C}_{70}$, which will correspond to adding to the £350 an amount given by the distance $(\hat{C}_{70}-C_{70})$, since this would leave the consumer on the same indifference curve as he is actually on in 1970 but with the 1950 amount of leisure. A good approximation to the distance $(\hat{C}_{70} - C_{70})$ is given by valuing the horizontal distance $(L_{70} - L_{50})$, which is 2 hours, at the 1970 real wage, this being the best approximation to the marginal rate of substitution of leisure for consumption in 1970.(1)

Before examining the results obtained by the Usher method, it is necessary to mention how the Usher method should be adapted in order to take account of the "optimistic" assumption (already introduced in connection with the Nordhaus/Tobin method) that leisure should be credited with the same productivity increase as working time. In this case, the difference in hours of leisure that has to be valued at the 1970 wage is not the difference in 'natural hours' $(L_{70}-L_{50}$ above), but the difference in "effective hours". This is given by the difference between (i) the actual hours in 1950 and (ii) the actual hours in 1970 multiplied by the index of real wages between 1950 and 1970.(2)

Finally, yet one more variant has to be considered. As already indicated, in many countries the relative growth of leisure will have been affected by changes in the age structure of the population, since this affects the proportion of non-active to total population, and the former are credited with more leisure time than the active population, and the leisure time of the former has not risen. Where the rise in the non-active population is caused by an increase in the pensioner population it might be thought inappropriate to include the extra total national leisure arising from the increased number of old people in the measure of MEW. However, the choice of procedure should depend partly on the reasons for the rise in the number of pensioners. For example, if it were the result of a reduction in the normal age of retirement rather than demographic changes, then it would seem perfectly reasonable to include the resulting increase in leisure as an offset to the fall in output. Obviously it corresponds to some rise in welfare for the people concerned, in the same way that a housewife who voluntarily drops out of the labour force will gain some welfare to offset the loss of national output (and her personal income). If, however, the rise in the number of pensioners is the result of demographic factors, either representing the past changes in birth rates and the earlier age structure of the population or some current increase in longevity amongst old people (or other changes in

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(1) It would be equally legitimate, of course, to compare C_{70} with $\hat{C}_{50}$, instead of $\hat{C}_{70}$, with C_{50}, in which case the correct procedure would be to deduct from C_{50} the value of the difference in leisure valued at 1950 real wages, in order to convert the point 1 to the point 4.

(2) Making the same assumption as earlier, namely that the productivity of leisure time has risen in proportion to the real wage.

age-specific mortality rates), it is not so clear that this corresponds to an increase in welfare or at least one that should be included under the 'leisure' heading.

No doubt most - but not all - old people feel that they are enjoying some welfare out of being still alive, but insofar as this is the result of increases in life expectancy, it should come under the separate imputation for this item mentioned in chapter 1 (page 7), and so its inclusion under leisure as well would amount to double counting. But even if the increase in the ratio of pensioners to the total population is the result of past trends in birth rates, rather than in death rates among older people, it could still be argued that their leisure is not a subtraction from national income since they would not be working anyway. Hence, it would be wrong, in comparing the income of two countries, say, to add an imputation to the income of one to allow for the fact that it has a larger pensioner population. On the other hand, it is arguable that the retirement age adopted in each country does, in fact, represent, in a way, the countries' trade-off of output or income against leisure for old people. If, for example, over the course of time, the retirement age were reduced to, say, 40 years of age, there would be no doubt that the reduction in output below what would otherwise have been possible has been accepted in order to add to welfare through increasing the leisure time of the population over that age.

(ii) The results

Since there is clearly room for differences in view on this question, and since, in principle, it would appear to be necessary, anyway, to distinguish statistically between the extent to which an increase in the proportion of pensioners can be attributed to (i) a reduction in the retirement age, (ii) past trends in birth rates and (iii) changes in age-specific death rates, the calculations here on the Usher method have been made both including and excluding the pensioner population.[1] The full results are summarised in Table 3.1 below together with the Nordhaus and Tobin results, and the individual countries' growth rates according to the various measures, as well as by the conventional G.N.P. measure, are shown in Tables 3.2 and 3.3.

(1) For present purposes this has been taken uniformly to consist of the male population over the age of 65 and the female population over the age of 60. More refined calculations - insofar as they were thought to be worthwhile - could take account of national differences in retirement ages, whereas the present procedure only takes account of differences in demographic structures.

For the average of the thirteen countries covered, the results may be summarised in the following table.

Table 3.1 Six Alternative Estimates of Average Growth Rates of Measurable Economic Welfare Per Head in Thirteen Countries, 1950/52 to 1971/73

(annual compound growth rates)

Measure	Growth Rate
Conventional G.N.P.	4.00
Measurable Economic Welfare:-	
Nordhaus/Tobin method	
(a) No productivity increase in leisure	2.02
(b) full productivity increase in leisure	4.17
Usher Method	
(i) Including Pensioners' Leisure	
(a) no productivity increases in leisure time	4.59
(b) full productivity increase in leisure time	7.56
(ii) Excluding Pensioners' Leisure	
(a) no productivity increase in leisure time	4.32
(b) full productivity increase in leisure time	7.09

It can be seen from Table 3.1 that the Usher method, even without attributing any productivity increase to leisure, leads to some rise in growth rates (per capita) over the period in question, from an average rate of 4.0 per cent per annum according to conventional G.N.P. measures, to 4.59 per cent or 4.32 per cent (including or excluding retirement pensioners respectively in the estimates of leisure). That, in countries where leisure per head of total population has been increasing, however slowly, the Usher method must raise the growth rate is,

of course,inevitable, since it amounts to making a positive addition to the end year G.N.P. without any addition to base year G.N.P.

It will also be seen that when leisure productivity is assumed to have risen with the real wage, the growth rate of MEW, at 7.56 or 7.09 per cent per annum depending on pensioners, is nearly twice as great, on the average, as that of G.N.P. (4.0 per cent), whereas the Nordhaus/Tobin method, even on the "optimistic" productivity assumption for leisure, showed no significant increase in the growth rate for the average of the thirteen countries, in spite of the fact that there has indubitably been a rise in leisure per head in most of them. Finally, Table 3.1 indicates that the exclusion of retirement pensioners from the population whose leisure time is evaluated does reduce the average growth rates somewhat, particularly under the "optimistic" productivity assumption for leisure.

Table 3.2 below shows the growth rates of per capita G.N.P. and M.E.W. for each of the thirteen countries covered, and Table 3.3. shows the corresponding rankings. As can be seen from the tables there are barely any significant changes in ranking. Four countries show growth rates of MEW slower than than growth rates of G.N.P. on the estimates that exclude the leisure of pensioners and that attribute no productivity increase to leisure time. These are Belgium, France, the U.K. and the U.S.A. These are all countries where - as shown in Table 2.2 above - there was a decline in leisure per head of population. It will be recalled that this took place even though leisure per member of the active labour force rose under the influence of longer holidays and shorter working hours, but to a degree that did not offset the increase in the size of the rest of the population to whom no leisure increase is imputed (and indeed some leisure decrease is imputed for part of the population). In the same way that an increase in output per head of the active population might not prevent a fall in output per head of total population, an increase in leisure of the former, if only slight, does not prevent a fall in leisure per head of total population.

If the leisure of the pensioner population is included, Belgium drops out of the group of four countries whose growth rate of MEW is less than that of G.N.P. (on the "pessimistic" productivity assumption for leisure). Of the remaining three countries, France drops one or four places in the ranking depending on the productivity assumption for leisure, but the U.K. and the U.S.A. cannot drop any further since they were at the bottom of the ranking already.

Of course, in all the estimates based on the "optimistic" productivity assumption for leisure, the growth rate of MEW per head is higher than that of GNP per head, even in the four countries where leisure per head of total population in terms of natural hours (i.e. as in Table 2.2 above) has declined slightly.

Table 3.2 Growth Rates of G.N.P. Per Head Adjusted for Changes in Leisure by Usher Method; 1950/52 to 1971/73

(annual compound rates)

Country	GNP (conventional measure)	Measurable Economic Welfare (GNP adjusted for change in leisure)			
		Including Pensioners' leisure		Excluding Pensioners' leisure	
		Method A	Method B	Method A	Method B
Austria	4.88	4.98	8.47	4.51	7.79
Belgium	3.55	3.62	6.70	3.49	6.22
Canada	2.43	2.64	6.03	2.67	5.72
Denmark	3.51	4.54	7.81	3.66	7.13
Finland	4.29	5.30	7.65	5.06	7.28
France	4.27	4.17	6.23	4.11	5.88
Germany	4.63	5.03	7.95	4.74	7.43
Italy	4.57	7.42	10.01	7.26	9.65
Japan	8.76	9.88	12.73	9.71	12.41
Norway	3.32	3.85	6.67	3.56	6.15
Sweden	3.18	4.09	7.65	3.70	7.02
United Kingdom	2.35	2.07	6.18	1.75	5.54
United States	2.16	2.02	4.24	1.91	3.93
Average	4.00	4.59	7.56	4.32	7.09

1) Methods A and B correspond to the two extreme productivity assumptions for leisure indicated in the text, namely A = no productivity increase in leisure time and B = productivity of leisure time increases at same rate as the real wage.

Table 3.3. Ranking of Countries' Growth Rates of GNP Per Head and Measureable Economic Welfare on Usher Method: 1950/52 to 1971/73

(annual average compound growth rates)

Country	GNP	Measurable Economic Welfare			
		Including Pensioners' leisure		Excluding Pensioners' leisure	
		Method A	Method B	Method A	Method B
Austria	2	5	3	5	3
Belgium	7	10	8	10	8
Canada	11	11	12	11	11
Denmark	8	6	5	8	6
Finland	5	3	6/7	3	5
France	6	7	10	6	10
Germany	3	4	4	4	4
Italy	4	2	2	2	2
Japan	1	1	1	1	1
Norway	9	9	9	9	9
Sweden	10	8	6/7	7	7
U.K.	12	12	11	13	12
U.S.A.	13	13	13	12	13

Chapter 4. The adjustment of growth rates for changes in income distribution

It is not as widely recognised as it should be that the conventional estimates of economic growth - as of national income at any point of time - implicitly embody some value judgements of a distributional character that, when brought out into the open for inspection, would generally be regarded as diverging from the real value judgements that most people, and most societies, would make concerning the equality of income distribution. National income is estimated in a manner that, in effect, attaches the same weight to a dollar of income received by a poor man as to a dollar of income received by a rich man. In the same way, the growth rates of national income, as conventionally measured, make no allowance for the fact that - in other contexts - most societies would probably want to attach greater value, or "social utility", or "welfare", to an increase of one dollar in the income of a poor man than to an increase of one dollar in the income of a rich man. Instead, the conventional growth rate measure is equivalent to a weighted average of the growth rates of the different income groups, such as the different deciles, with the weights being equal to the shares of each group in total income. Thus if, for example, the top decile receives about 30 per cent of total income and the bottom decile receives about 2 per cent, the growth rate of income of the top decile will carry 15 times the weight of the growth rates of the bottom decile in the weighted average growth rate, which is what simple G.N.P. growth rates amount to.

This conventional procedure stems from a fairly deeply entrenched practice in economic theory of drawing a sharp distinction between the size of national product and its distribution. From time to time some economists have objected to this distinction, including de Graaff many years ago and Amartya Sen more recently.(1) Their position is that, as a measure of economic welfare, one cannot say what total national income at any point of time is until one knows its distribution. Similarly, most people would agree - either in respect of their individual preferences or in respect of their 'societal' preferences - that more weight should be attached to a given increase, over time, in the income of a poor man than to an equal increase accruing to a rich man. Indeed, for some time now explicit allowance for distributional weights have been incorporated into investment project evaluation procedures, such as those adopted by Little and Mirrlees and others.(2) It would seem inappropriate, therefore, in any experimental calculations of "measurable economic welfare" to ignore what many writers would consider to be the most flagrant weakness of the conventional

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(1) See J. de V. Graaff Theoretical Welfare Economics, 1957 , page 92, and A. Sen "Real National Income", Review of Economic Studies, 1976.

(2) I.M.D. Little and J.A. Mirrlees Project Appraisal and Planning for Developing Countries (London, 1974); D. Lal. Methods of Project Analysis - A Review (Johns Hopkins, 1974); UNIDO, Guidelines for Project Evaluation (U.N.O., 1972).

measures and one that is of greater potential policy significance than changes in leisure (let alone the concentration of carbon monoxide in the upper atomosphere!)

In fact, a recent study by the World Bank in conjunction with the University of Sussex, Redistribution with Growth (RWG), made a pioneering attempt to adjust the growth rates of a number of developing countries for changes in their income distribution by attaching explicit weights to the growth of income of the main income groups. This study used two alternative sets of weights to combine the growth rates of individual income groups. The first, which they described as the "equal weights" index, gives the growth rate of every individual's income an equal weight, even though a 1 percent growth in the income of a poor group will represent far less addition to national income in absolute amounts than would a 1 percent growth in the income of a rich group. This means that the growth rates of income of individual income groups are weighted according to their population, so that, say, decile groups each have one tenth weight in the combined growth of income. The second RWG index, described as a "poverty weights" index, is constructed by giving the growth of the lowest 40 percent of the population, three times the weight (per head) of the growth of incomes in the top 20 per cent, and twice the weight (per head) of the middle 40 per cent of the population.

Whilst this method of adjusting growth rates to incorporate distributional changes constitutes an imaginative and useful supplement to the conventional measures of economic growth, it seems to raise one or two questions that need to be clarified before the method can be used with any confidence. First, with the RWG method it is not quite clear, in the end, what it is exactly that is supposed to be growing at the adjusted growth rate. Apparently the objective is to measure the growth rate of economic "welfare" or social "utility". But to do this it is not enough to measure the absolute increase in utility over any given time period; the initial absolute level of utility is also needed. Now, in the context of a relatively general form of utility function, all that is needed to measure the absolute increment of utility corresponding to any increase in income is to attach values to the parameters that enter into the derivative of utility with respect to income. Diagrammatically, all that is required is the slope of the curve relating utility to income; one does not need to know the height of the curve. To proceed to an estimate of the proportionate growth in utility, however, some estimates of the absolute level of utility from which one started is required and this, in turn, would appear to require going further in attaching cardinal values to all the parameters of a respectable utility function than one would normally be willing to go.

In RWG the problem seems to be "solved" in the following manner. First, the growth rate of social "welfare" is defined as the weighted sum of the growth rates of income of the individual income groups in society.(1) From this one

(1) H. Chenery et. al. page 39. In fact, the authors refer to the growth rate of any group's income, g_i as measuring "the increase of its social welfare.." (my italics); but this may be simply a loose expression, since the social welfare derived from its income growth presumably depends on the social welfare function, and it is only the growth of that income group's welfare that is measured by g_i (at best).

would normally expect that the weights would be explicitly derived from a welfare function - i.e. a function explicitly relating incomes of each group to social welfare. However, no such function is specified. Instead, the next step in the calculation is to specify a "utility" function of an extremely simple form, containing no constant or scalar term, so that the absolute value of utility is given as a simple function of the absolute levels of income, as follows:-

$$U = n_i \beta_i \log Y_i \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

(where n_i = the number of individuals in each group and
Y_i = the income of the i^{th} group)

$$\text{which gives } dU = \Sigma\, n_i \beta_i \left(\frac{dY_i}{Y_i}\right) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

If this were to be converted into a proportional growth rate of utility, it would then be necessary to divide through by total utility as given by equation (1). But this is not done. Instead, various normalisation procedures are suggested which involve making the weights sum to unity. One procedure is to divide through equation (2) by βN (where $N = \Sigma\, n_i$ and all $\beta_i = \beta$), which amounts to giving equal weight in the definition of social welfare to groups of equal population size. This is the "equal weights" index. Another is to divide through by $\Sigma\, n_i\, \beta_i$, which requires attaching arbitrary values to the β_i, and is the procedure adopted in the "poverty weights" index, where lower income groups are allocated a higher value of β.

In the former case, the authors state that the resulting measure approximates "the increment in welfare dU up to a scalar multiple given by $\frac{1}{\beta N}$".(1) In the latter case, they state that the weighted growth rate measures the utility increment up to a scalar transformation given by $1/\Sigma\, n_i \beta_i$. In the former case, the expression "the increment in welfare dU..." seems to imply that they are using the terms "welfare" and "utility" to mean the same thing, although this does not seem consistent with their earlier distinction between the growth rate of social welfare defined completely generally as some weighted average (the weights being unconstrained and unrelated to incomes) of growth rates of income of individual groups and their later introduction of an explicit utility function.

In the end, therefore, it is not quite clear what the growth rate that they measure is a growth of. It is not the growth rate of utility, since, as indicated above, this would require dividing through equation (2) by equation (1). It is presumably intended to be the growth rate of social welfare, and although their procedure does mean that this can be measured as the growth of utility derived from an explicit utility function, multiplied by various scalars according to the arbitrary weighting systems adopted, this procedure only works insofar as (i) the utility function is of the simple form used, which eschews any constant or scalar terms to begin with, and (ii) does not use weights in the welfare

(1) ibid. page 50.

summation that are functionally related to income.[1]

In other words, the whole procedure amounts to saying that the proportionate income growth rates for individual groups can be made to give an overall proportionate growth rate of welfare if they are weighted together by weights that sum to unity. It is then shown that it is possible to derive sets of weights that sum to unity from an explicit utility function in such a manner that the resulting apparent aggregate growth rate equals the absolute growth of utility multiplied by various scalars according to the particular weighting procedure adopted. In the end, however, the extent to which these represent any comparable growth rates of utility or welfare, or anything else, is not clear.

Furthermore, although the normalisation procedure used to ensure that the weights add to unity does, given their particular choice of weights, imply the interpretation of the result that they show, the choice of weights is still essentially arbitrary in the sense that they are not explicitly derived from a welfare function. It is true that in one case (the "equal weights index") the weights happen to be systematically related to the income levels of the groups concerned, but even here the relationship does not reflect any explicit preference relationship between equality and any other objective, unlike the key parameter indicating degrees of "inequality aversion" used in the Atkinson index discussed below. But, as shown below, it can be shown to correspond to such a relationship in the context of the Atkinson utility function.

Apart from the inherent unattractiveness of a procedure that seems to amount to introducing by the back door some absolute values to be attached to levels of welfare such a step would raise another problem, namely whether it is then legitimate, in ascribing weights to individual income groups in each country, to ignore the different income levels of the various countries concerned. For if one is prepared to attach absolute numerical values to "utility", given only the values of income, and evaluate total utility from the income information available, it would seem logically necessary, in the interest of consistency between countries, to allow for differences in their overall income levels in attaching weights to individual income groups within each country. For example, the growth rate of income of the poorest group in a rich country should perhaps get a smaller weight than that of the richest group in a poorer country.

However, this whole problem is a difficult one and it would be inappropriate to explore it further here, particularly since an alternative method is used below that does not seem to raise these questions. The method adopted below also illustrates what is, perhaps, the last disadvantage of the RWG method mentioned above. This is that it does not seem possible to interpret the particular weighting systems used in RWG in a manner that corresponds precisely

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(1) In the "equal weights" index, however, the use of population weights in conjunction with growth rates of incomes of each group implicitly relates the β of the utility function to income. This is why this particular index can be given a clearer interpretation in the context of the Atkinson utility function discussed below.

to the sort of value judgements that society would probably, in principle, wish to place on the degree to which it dislikes equality. This is because, like everything else in economics, the notion of the degree to which society (or an individual) likes or dislikes anything only makes sense in the concept of its relative preferences as against alternatives. The classic joke about the economist who meets, after a lapse of time, a friend who asks him "And how is your wife these days?", and who replies "Compared to what?" represents a fundamental aversion, in economics, to attaching cardinal values to entities that cannot legitimately support them.

The obvious candidate for a numeraire against which society's value judgements concerning equality can be compared is "efficiency", or output.(1) That is to say, a simple intuitive interpretation of different degrees of society's preference for equality, or its aversion to inequality, would be in terms of the amount of efficiency or output that society would be prepared to sacrifice in order to obtain a further given increase in equality. What is required, therefore, is some method by which alternative rates at which society would be prepared to make this trade-off can be converted precisely into alternative weighting systems for adjusting growth rates for changes in income distribution. Put another way, although any weighting system that reflects society's value judgements concerning equality is, in the end, essentially arbitrary, the arbitrariness of the RWG method starts too early since it does not even reach the point of being in terms of society's relative preference for equality as against anything else.

Fortunately, a less arbitrary method is already available if one makes use of the utility function of the form proposed by Atkinson in connection with his related new measure of equality, namely the concept of "equally distributed income". In order to emphasise the contrast between the Atkinson approach and the RWG approach, it should be pointed out at the outset that, although Atkinson's formulation and measure of inequality is derived from a utility function, by abstaining from attributing to certain of the parameters of the function, what is measured, in effect, is the level of total income in any country that, if equally distributed, and given society's value judgements concerning inequality, would give society the same utility as the actual unequally distributed total income of the society, whatever that utility may happen to be.

Furthermore, applied to the equality problem, Atkinson's utility function, and hence his measure of equality, is both relatively easy to interpret in terms of simple questions - or "thought experiments" - that may be put to people about their attitudes to equality, and also corresponds to a measure of inequality that

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(1) This does not mean that it is only the trade-off of equality against efficiency that matters, or that should matter, to society. It is arguable that it is the trade-off of equality against freedom that poses the most important problems. But the equality-efficiency trade-off is traditionally central to the debate about equality, and provides, as in the Atkinson measure explained below, a very convenient starting point for an intelligible intuitive explanation of the weights that can be used to adjust growth rates for distributional considerations.

is independent of the average level of incomes in the different countries concerned.[1]

It will be recalled that the basic idea of the Atkinson measure of inequality is as follows. It begins on fairly common ground, namely that, roughly speaking, the shape of society's utility function relating income to the social welfare derived from incomes accruing to people indicates the importance that society attaches to equality. For example, a society that attached no importance to equality would derive as much extra utility from an increase in a rich man's income as an increase in a poor man's income. The utility function for a society that attached a slight importance to equality would show a gradual decline in the marginal utility attached to successive increases in incomes, and the utility function of a society that attached a lot of importance to equality would show a much sharper decline in the marginal utilities of income of the richer people in society. Atkinson proposes a utility function of the form:-

$$U(y) = \frac{A + By^{(1-\epsilon)}}{1-\epsilon} \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

($\epsilon \neq 1$ and ≥ 0 for diminishing marginal utility)

and $$U(y) = A + B \log_e y \qquad (\epsilon = 1) \qquad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1')$$

The required notion of the trade-off between equality and efficiency, or output, enters into the interpretation of the parameter, ϵ, in the following manner. As already indicated, society's degree of "inequality aversion" may be looked at as the rate at which the marginal utility of income attached by society to the incomes of people (or income groups) at different income levels falls off as their income rises.[2] But this can be transposed into a measure of how much total income society is prepared to 'lose' in order to carry out any give redistribution of income. For example, the marginal utility of an extra pound to a rich man is regarded as being only half as great as the marginal utility of an extra pound to a poor man, then society would be quite willing to take a pound away from the former and give only half of it to the latter (the other half being 'lost' as a result of the transfer - e.g. administrative or resource allocation costs of the redistributive process). If, however, in a comparison of the same two people, society experienced a much greater degree of "inequality aversion" so that the marginal utility of the rich man's income was regarded as being only one quarter

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(1) See A.B. Atkinson "On the Measurement of Inequality", Journal of Economic Theory, Vol. 2, 1970, reprinted in A.B. Atkinson (ed.), Wealth, Income and Inequality, Penguin Modern Economic Readings, Harmondsworth, 1973, chapter 3.

(2) It does not matter for present purposes whether it is assumed that, as a matter of fact, it is the marginal utilities of income to the individuals concerned that decline in the manner indicated or whether it is the marginal utility attached to these incomes by society - seen as a separate entity - that diminishes in this way. The relationship between social welfare and that of individuals is, of course, one of the most difficult and - so far - unsolved central problems of welfare economics and the theory of social choice.

of that of the poor man, society would accept a transfer even if 75 percent of the pound taken from the rich man were lost in the process, and the poor man obtained only £0.25p.

More precisely, if y_1 and y_2 represent the two incomes in question society will accept a transfer as long as

$$d_1 \frac{\partial U}{\partial y_1} = d_2 \frac{\partial U}{\partial y_2} \quad \ldots\ldots(2)$$

But, from the utility function of equation (1), $\frac{\partial U}{\partial y} = y^{-\epsilon}$

so society will accept a transfer such that

$$\frac{d_1}{d_2} = \left(\frac{y_1}{y_2}\right)^{\epsilon} \quad \ldots\ldots(3)$$

Hence, since the value of ϵ can be used to indicate precisely how much society would be prepared to "lose" in order to carry out a particular transfer from rich to poor, it can also be used, in conjunction with data on the whole income distribution, to estimate what would be the total income which, if equally distributed, would provide the same welfare (utility) as the actual inequally distributed income. For, assuming that ϵ is positive, society would accept a lower total income that was equally distributed as being 'as good as' the existing total income that is unequally distributed. The precise ratio between this "equally distributed equivalent" income and the actual income depends, obviously, on the value of ϵ. This ratio is the key ingredient in Atkinson measure of inequality at any point of time. Thus, ϵ is an indicator of "inequality aversion" that can be easily interpreted in the manner just described.(1)

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(1) For example, in the particular case used for illustrative purposes by Atkinson (Economics of Inequality, Oxford, 1975, page 49) where y_1 is twice y_2, if society will accept that the poor man receives only half of the income taken from the rich man (assuming relatively small transfers), so that $d_1/d_2 = 2.0$, the value of ϵ must be unity in order to satisfy equation (3). Some other values of acceptable ratio of the two increments, which correspond to Atkinson's 'x', are tabulated below for various values of ϵ and of the ratio of the two incomes in question:-

Value of dy_2/dy_1)= Atkinson's 'x')

y_2/y_1 \ ϵ :-	½	1	2
0.5	.7	.5	.25
0.25	.5	.25	.06

Alternatively, as Atkinson points out, "the concept of equally distributed equivalent income is closely related to that of a risk premium or certainty equivalent in the theory of decision-making under uncertainty".(1) Roughly speaking, the equally distributed income is the amount that an individual would accept rather than accept a range of different amounts each having a size and probability corresponding to the frequency distribution of the incomes in question. Thus, if we could ignore differences in initial capital assets, frequency of payments and so on, in a simple example where an individual is faced with an equal chance of receiving £1 or £10, the minimum certain amount he would accept instead is an indicator of the value he attaches to the parameter ϵ. If, for example, his value of ϵ is 0.5 (i.e. he is mildly risk averse) he will accept a sum only just below the average of the two amounts in question, namely £4.33. If, however, he would settle for £1.82 rather than accept the 50% chance of getting only £1.00, (together with a 50% chance of receiving £10) this would imply a value of ϵ of 2.00.(2) In the absence of altruism, the relationship between risk aversion and inequality aversion is clear. For, in the example just given, the individual's response can be interpreted as his preference between living in an inegalitarian society in which he runs a risk of being the poor man who receives only £1, and living in a completely equal society in which he (and everybody else) receives an average income less than that of the unequal society (£5.50). If attitudes to equality were purely non-altruistic, therefore, the value of the parameter ϵ could be deduced from information about risk aversion.

Given values of ϵ, it is possible to measure the growth rates of "equally distributed income" by various procedures. The method adopted here is to estimate the "equally distributed income" (EDE) in the terminal years, and then estimate

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(1) A.B. Atkinson, "On the Measurement of Inequality", reprinted in A.B. Atkinson (ed.) Wealth, Income and Inequality, op. cit., page 52.

(2) I have greatly benefited from discussion with Professor Dan Usher on this point. In the simple case here the values of ϵ are implied by the equation $\bar{y} = \left[\left(\frac{1}{2}\right)^{1-\epsilon} + \frac{1}{2}(10)^{1-\epsilon}\right]^{\frac{1}{1-\epsilon}}$ where $\bar{y}$ = the acceptable payment.

the growth rates of the EDE.[1] This, as indicated above, means that one is, in effect, measuring the growth of whatever level of income, in each of the terminal years, would, if equally distributed, have given the societies in question, the same utility as their actual unequally distributed income, whatever that utility may have been. The growth rate measured this way would only equal the growth rate of "utility" or "welfare" if the elasticity of the latter with respect to EDE were equal to unity.

The formula for "equally distributed income" that Atkinson derived from the utility function of equation (1) above is:-

$$EDE = \left[\sum_i y_i^{1-\epsilon} f(y_i)\right]^{1/1-\epsilon} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (6)$$

where $f(y_i)$ is the frequency of the ith income)

so that where, as in this case, the data are in decile form,

$$EDE = \left[\frac{1}{10}\sum_i y_i^{1-\epsilon}\right]^{1/1-\epsilon} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (7)$$

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(1) An alternative procedure, which explicitly introduces the growth rates of income of each income group into the calculations, as in RWG, would be as follows:-

from the utility function of equation (1) above

$$dU = \sum_i \left[B y_i^{-\epsilon} dy_i\right] \quad \ldots\ldots\ldots\ldots\ldots (4)$$

so that

$$dU = \sum_i \left[B y_i^{1-\epsilon} \frac{dy_i}{y_i}\right] \quad \ldots\ldots\ldots\ldots\ldots (5)$$

In other words, ignoring B which is a scalar in the utility function, this expression is a weighted average of the growth of income of each group, the weights being $(1-\epsilon)$. With $\epsilon = 1$, this would amount to giving the same weight to the income growth rate of each person (or group of equal size), which is what is done with the RWG "equal weights" index. Hence, if the same utility function were to be accepted, it would be possible to provide an interpretation of the RWG "equal weights index", namely that it represents the weighting pattern corresponding to a society where $\epsilon = 1$, which, as shown above, indicates a willingness to lose half of any transfer at the margin when the transfer is from one person to somebody with half the income.

However, as with the RWG procedure, this method then raises the problem of normalising the estimate of the absolute value of dU obtained from (5) above, to obtain a proportionate growth rate. The obvious procedure is to replace the y_i, in the original equation by $\frac{y_i}{Y}$ (where $Y = \sum y_i$) which amounts to dividing dU by Y or to divide dU by the sum of the weights, which is open to the same sort of objection as indicated above in connection with RWG; the value of the parameter B in equation (1) is implicitly set at unity and A is set at zero. In other words values are given to parameters of the utility function order to attribute, implicitly, an absolute value to utility (by setting A = 0 and B = 1 in equation (1) above).

The results are shown in Table 4.1 below, which compares the growth rates as conventionally measured with the growth rates of "equivalently distributed income". Estimates have been possible only for such countries and such periods for which reasonably comparable estimates of income distribution data have been available.(1) Table 4.1 also shows the growth rates of the equality measure corresponding to the various values of the parameter, ϵ, that have been used to estimate EDE in each of the terminal years and hence the growth rates of EDE. For the ratio of equally distributed income to GNP as conventionally measured may be taken as a measure of equality. Hence, there is a precise relationship between the growth rates of GNP, the growth rates of EDE, and the growth rates of the equality measure.(2)

It will be seen in Table 4.1 that with the exception of France (particularly if a high value of ϵ is adopted), allowance for changes in income distribution barely affect the growth rates of most countries. Taking $\epsilon = 1$, for example, which is probably as far as most people would go in trading off equality against efficiency, no country's growth rate, apart from that of France, has differed from the conventional GNP growth rate by more than a fraction of a percent point, so that their ranking is not affected. This is not because, as a matter of principle, the method used virtually precludes any major impact from income distribution effects (as with the Nordhaus/Tobin leisure imputations described in chapter 2). For in other countries - notably certain developing countries - the impact on measured growth rates of an adjustment for changes in income distribution is very large.(3) The reason for the absence of much impact in the countries covered here over the periods in question is simply that, in these cases, there has been no significant change in income distribution whatever measure one uses to evaluate the change. As is well-known, the long run equalization process that had taken place in the few decades leading up to the early 1950s seems to have more or less come to a halt thereafter in most advanced countries. There is a partial statistical explanation of the results for France arising out of the fact that the basic data

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(1) The data have been taken mainly from the O.E.C.D. Economic Outlook; Occasional Studies "Income Distribution in O.E.C.D. Countries" by M. Sawyer, Section V, July 1976.

(2) Where y = Income, E = Equality, f = first year, 1 = last year, g = growth rate per annum (compounded annually)

$$\frac{Y_l}{Y_f} = (1+g_y)^n \; ; \; \frac{EDE_l}{EDE_f} = \frac{Y_l}{Y_f} \cdot \frac{E_l}{E_f}$$

$$\text{so } (1+g_{EDE})^n = (1+g_y)^n (1+g_\epsilon)^n$$

$$\text{so } g_{EDE} = g_y + g_\epsilon + g_y g_\epsilon$$

(3) See article by present writer "Reflections on 'Redistribution With Growth'", forthcoming in World Development.

exclude certain forms of public benefits paid to the lowest deciles and that have declined considerably in relative importance over the years. Hence, since these benefits are excluded from the income of the lower income groups, larger amounts are excluded from their incomes in the earlier years than in the later years, which gives the appearance of a sharp rise in their incomes. If it had been possible to include these benefits in incomes, the sharp rise in the shares of the lowest deciles would have been moderated and possibly disappear.

Table 4.1 Growth Rates of G.N.P., "Equally Distributed Incomes", and Equality[1]

(annual average compound growth rates)

Country	Period		Conventional G.N.P.[2]	"Equally Distributed Income" $\epsilon = 0.5$	$\epsilon = 1.0$[3]	$\epsilon = 2.0$
Canada	1951-1972	"Income"	5.72	5.64	5.49	4.86
		Equality		- 0.08	- 0.22	- 0.81
France	1962-1970	"Income"	5.77	6.76	7.99	10.39
		Equality		+ 0.94	+ 2.09	+ 4.36
Germany (i)	1950-1973	"Income"	6.09	6.11	6.16	6.41
		Equality			+ 0.05	+ 0.28
Germany (ii)	1960-1973	"Income"	4.33	4.27	4.27	4.43
		Equality		- 0.06	- 0.06	+ 0.09
Japan	1962-1972	"Income"	10.41	10.59	10.76	11.13
		Equality		+ 0.14	+ 0.30	+ 0.63
Netherlands	1954-1967	"Income"	4.84	5.06	5.34	6.17
		Equality		+ 0.22	+ 0.48	+ 1.27
U.K.	1963-1972	"Income"	2.55	2.46	2.33	1.98
		Equality		- 0.09	- 0.22	- 0.57
U.S.A. (i)	1952-1972	"Income"	4.07	4.05	4.03	4.04
		Equality		- 0.03	- 0.04	- 0.04
U.S.A. (ii)	1962-1972	"Income"	4.18	4.15	4.18	4.52
		Equality		- 0.05	- 0.01	+ 0.32

Source. Various national publications and O.E.C.D. estimates

(1) 'Equality' is defined as the ratio of 'equally distributed income' to GNP. Since, apart from the case of complete equality, measures of "equality" have only an ordinal - not a cardinal - significance, the figures shown above in the second row for each country represent the changes in the particular measure used, not in "equality" in some cardinal sense.

(2) The GNP growth rates here are based on different time periods and, in some cases, slightly different concepts (in order to match the income distribution data used) from those used in chapter 2 above and are not per capita.

(3) In the interests of simplifying computing procedures, the estimates for $\epsilon = 1.0$ have actually been made with $\epsilon = 0.98$, thereby avoiding the need to switch from using equation (1) above to equation (1') above. The error involved is, of course, negligible.

Chapter 5. Conclusions

The main conclusions, which have been indicated in the respective chapters, may be summarised as follows. An adjustment to G.N.P. to allow for changes in leisure in the 21 year period covered (1950/52 to 1971/73) in order to move towards a better indicator of the growth of "Measurable Economic Welfare" in the thirteen countries covered does not significantly change the ranking of the growth rates of the countries concerned. There are various methods by which the adjustment may be made, and the choice of method does make a large difference to the overall growth rates of all the countries. But although the choice of method leads to a large change in the general scale, it still does not significantly affect the ranking of countries. It is true that with some methods the ranking of individual countries - particularly those in the middle of the ranking - does change quite a lot depending on the relative growth of leisure to G.N.P., and the shares of leisure in total "measurable economic welfare", taking the average of all the methods leaves the rankings not greatly changed, as can be seen in Table 5.1 below.

In other words, although different methods of imputing for leisure appear to have a major impact on growth rates, any given method applied uniformly to all of the thirteen countries covered tends to raise or lower their growth rates fairly uniformly, so that the ranking of countries is not by any means transformed. Hence, the usual old assumption that G.N.P. is a pretty good indicator of economic welfare growth rates is supported, subject to a qualification mentioned below. The reason for this is, of course, that there is not much scope for dramatic inter-country differences in the changes in average working hours. Hence such changes in rankings that do take place reflect mainly the influence of demographic factors, such as a change in the age structure of the population. So the overall scale of growth rates changes, but the relative performance of the countries changes far less. And since the notion of the overall scale is difficult to interpret in any meaningful manner (since little sense can be attached to the concept of the base point in economic welfare), it is relative performance which matters chiefly.

There is, however, one qualification to this result. This is that, although any given method applied uniformly to all countries does not greatly change the relative position of most countries, it may well be that the countries should not be treated in a uniform manner. The importance of this point arises because another result emerging from the calculations is that the picture is very much affected by the choice between two alternative extreme assumptions concerning the deflation of changes in the value of leisure. These assumptions reflect alternative views as to the degree to which technical progress in the use of leisure time (i.e. increased productivity of leisure time) should be assumed to be zero or to be rather like that obtained in the use of working time. In other words, does an hour of leisure give as much satisfaction as it did twenty years ago, or does it give more on account of technical progress, or increased facilities, that enable people to get more out of an hour of leisure

now than twenty years ago. Now although the choice between these assumptions, applied uniformly to all countries, makes a large difference to the overall scale without greatly affecting the ranking, it may well be that countries differ considerably in the extent to which the developments therein approximate one assumption rather than the other. For example, a country that had greatly expanded facilities to enable people better to enjoy their leisure would need to be treated differently from countries that had done nothing about it.

Table 5.1 Comparison of rankings of growth rates of G.N.P. per head and average of rankings of growth rates of measurable Economic Welfare per head, 1950/52 to 1971/73

Country	G.N.P. Growth Ranking	Average of "Measurable Economic Welfare" (1) Rankings
Austria	2	4
Belgium	7	9
Canada	11	11
Denmark	8	6
Finland	5	5
France	6	7
Germany	3	3
Italy	4	2
Japan	1	1
Norway	9	10
Sweden	10	8
U.K.	12	12
U.S.A.	13	13

(1) The figures shown here are the rankings of the averages of the actual rankings for each of the six variations on MEW shown in the preceding chapters (two on the Nordhaus/Tobin method and four on the Usher method).

This conclusion would appear to have some bearing on desirable directions of future work on certain social indicators, notably those relevant to the use of leisure time and the extent to which leisure time adds to welfare. The methodology of the present study simply measures leisure in terms of hours - i.e. as an input into some activity that is presumed to confer welfare on those who dispose of the hours in question. Insofar as social indicators could help distinguish between countries with respect to the extent that facilities exist for deriving satisfaction from available leisure hours, they might be able to

demonstrate that for some countries different assumptions should be made with respect to the likely increase in the productivity of leisure. If this justified discriminating between countries with respect to the particular assumptions - and hence method of estimation used - in the above calculations, it could well be that their ranking would change more substantially than the above estimates suggest.

As regards income distribution, the estimates made have not covered as many countries or the same period. Nevertheless, it appears that the measured growth rates are significantly affected in one or two cases, particularly if one adopts a method that represents a fairly high degree of "inequality aversion". But the chief reason why most countries are not much affected is that for most of the countries under consideration in the period in question income distribution has not changed much anyway. And the basis of the method amounts to attaching different weights to the growth rates of income of the various income groups. If they have all grown at roughly similar rates, the overall growth rate is not much affected by the particular weighting pattern used, so that changes in the weighting pattern to reflect different value judgements concerning the importance of the increases in income in the different income groups will not make much difference to the results.

As can be seen in the following selection of results, however, there are often one or two cases where the change in the income distribution appears to have made a significant impact on the growth rate as measured. One of them, however, illustrates the sort of pitfalls encountered in working with such income distribution data as are available. This is France, where the data appear to indicate a substantial improvement in French income distribution. But this is partly an illusion arising out of the fact that the basic data exclude certain forms of public benefits paid to the lower income groups and that have declined considerably in relative importance over the years, so that the data exclude from the income of these groups much larger amounts in the earlier years than in the later years. This, and other reservations about the data, underline the need for much more work to be done on the international comparability of income distribution data, following up the sort of work initiated in the Economics and Statistics Department of the O.E.C.D.

In conclusion, it seems that the above results demonstrate that G.N.P. is a fairly good indicator of relative growth of measurable economic welfare and that when other quantifiable items are added they do not have any very significant effect on relative performance over the period covered and subject to the reservation above concerning the productivity of leisure. As for income distribution, this could be potentially the source of much more important changes in national rankings, but, in fact, distribution has not changed much in the countries concerned during the last decade or so. This means that one should not attach too much importance to the reservations that have become fashionable during the last few years concerning the extent to which G.N.P. growth rates are good indicators of performance in promoting economic welfare.

Table 5.2 Rates of Growth: Comparison of G.N.P. with measures adjusted for changes in income distribution

Country	Period	G.N.P. (conventional measure)	G.N.P. adjusted for changes in income distribution(a)
		annual average compound rates	
Canada	1951-72	5.72	5.49
France	1962-1970	5.77	7.99
Germany (i)	1950-1973	6.09	6.16
(ii)	1960-1973	4.33	4.27
Japan	1962-1972	10.41	10.76
Netherlands	1954-1967	4.84	5.34
U.K.	1963-1973	2.55	2.33
U.S.A. (i)	1952-1972	4.07	4.03
(ii)	1962-1972	4.18	4.18

Source: See Table 4.1 above

(1) The rates of growth adjusted for changes in income distribution shown above have been calculated on the basis of one particular value of a parameter indicating "inequality aversion". This is one that can be interpreted as indicating that society would accept a transfer of £1 from a person to a person having half his income (ignoring capital assets etc.) as long as the loss arising (e.g. tax collection costs, resource misallocations, etc.) did not exceed £0.50. Calculations have been made for other values of the "inequality aversion" parameter in Chapter 4, which also contains a full explanation of the methodology involved.

Annex A. Nordhaus/Tobin Method; Basic Data and Calculation Sequence

(i) Variables (see Table A1 below)

Source				
(I + K) x 4477	A	Leisure per economically inactive male or female	1950-52	(4477 hours per annum throughout)
Maddison, op.cit. TABLE B3	B	Ave: male hours worked	1950-52	Hours p.a.
	C	" male " "	1971-73	Hours p.a.
(J + L) x 4189	D	Leisure per inactive person	1971-73	(4189 hours per annum throughout)
	E	Active male population > 15	1950-52	Thousand
	F	" " " "	1971-73	
(1) OECD Labour Force Statistics	G	" female " "	1950-52	Thousand
	H	" " " "	1971-73	
(2) UN Demographic Handbook	I	Inactive Male " "	1950-52	Thousand
	J	" " " "	1971-73	
	K	Inactive female " "	1950-52	Thousand
	L	" " " "	1971-73	
	M	Male wage rate	1950-52	
(1) OECD Labour Force Statistics	N	" " "	1971-73	Local currency
(2) UN Statistical Yearbook	$\frac{M}{N}$	Female " "	1950-52	
	P	" " "	1971-73	
National Accounts on OECD Countries (1950-68, 1962-73)	Q	Consumer Price Index	$\frac{1971-73}{1950-52}$	
National Accounts of OECD Countries (1950-68 p.12, 1962-73 p.442)	R	GNP 1971-73 at 1950-52 prices		Millions local currency
	S	GNP 1950-52 at current prices		

(ii) Calculation Procedure

Step		
1	B x 0.85 = T	(Ave: Female hours worked 1950–52)
2	C x 0.85 = U	(" " " " 1971–73)
3	5824 – 1.14B = V	(Active male leisure per person 1950–52)
4	5824 – 1.14C = W	(" " " " " 1971–73)
5	5824 – 1.14T = X	(" female " " " 1950–52)
6	5824 – 1.14U = Y	(" " " " " 1971–73)
7	E x V = Z	(active male leisure 1950–52)
8	F x W = α	(" " " 1971–73)
9	G x X = β	(" female " 1950–52)
10	H x Y = γ	(" " " 1971–73)
11	J x A = δ	(inactive male leisure 1950–52)
12	J x D = ϵ	(" " " 1971–73)
13	K x A = η	(" female " 1950–52)
14	L x D = λ	(" " " 1971–73)
15	Z x M = ν	(Value active male leisure 1950–52)
16	α x M = τ	(" " " " 1971–73)
17	β x $\bar{\phi}$ = ρ	(" " female " 1950–52)
18	γ x P = θ	(" " " " 1971–73)

(For subsequent steps, variables in brackets indicate two alternative assumptions)

19	δ x (M, 0.5M) = (ϕ_1,ϕ_2)	(Value inactive male leisure	1950–52	Assumptions (1) & (2))
20	ϵ x (N, 0.5N) = (Ψ_1,Ψ_2)	(" "	1971–73	" (1) & (2))
21	η x ($\bar{\phi}$, 0.5$\bar{\phi}$) = (w_1, w_2)	(Value inactive female leisure	1950–52	" (1) & (2))
22	λ x (P, 0.5P) = (ι_1,ι_2)	(" "	1971–73	" (1) & (2))
23	ν + (ϕ_1,ϕ_2) = (Ω_1,Ω_2)	(Total value male leisure	1950–52	" (1) & (2))
24	τ + (Ψ_1,Ψ_2) = (T_1,T_2)	(" "	1971–73	" (1) & (2))
25	ρ + (w_1,w_2) = (Δ_1,Δ_2)	(Total value female leisure	1950–52	" (1) & (2))
26	θ + (ι_1,ι_2) = (Θ_1,Θ_2)	(" "	1971–73	" (1) & (2))

Step

27 $(\Gamma_1, \Gamma_2)_x \frac{M}{N} = (\Lambda_1, \Lambda_2)$ (Total value male leisure 1971-73 deflated by wage rate Ass. (1) (2))

28 $(\Theta_1, \Theta_2)_x \frac{P}{\phi} = (\Sigma_1, \Sigma_2)$ (Total value female leisure 1971-73 deflated by wage rate Ass. (1) (2))

29 $(\Gamma_1, \Gamma_2)\ Q = (a_1, a_2)$ (Total value male leisure 1971-73 deflated by price index. Ass. (1) (2))

30 $(\Theta_1, \Theta_2)\ Q = (b_1, b_2)$ (Total value female leisure 1971-73 deflated by price index. Ass (1) (2))

31 $(\Omega_1, \Omega_2) + (\Delta_1, \Delta_2) + R = (c_1, c_2)$ ('welfare' 1950-52 Ass. (1)& (2))

32 $(\Lambda_1, \Lambda_2) + (\Sigma_1, \Sigma_2) + S = (d_1, d_2)$ ('welfare' 1971-73 Ass. (1)& (2)) wage rate deflator

33 $(a_1, b_2) + (b_1, b_2) + S = (e_1, e_2)$ ('welfare' 1971-73 Ass. (1)& (2)) price index deflator

34 $\left[\frac{(d_1, d_2)}{(c_1, c_2)}\right]^{\frac{1}{21}} - 1 = (f_1, f_2)$ (Average annual compound growth rate 'welfare' $\frac{1971-73}{1950-52}$ Ass. (1) (2) wage rate deflator

35 $\left[\frac{(e_1, e_2)}{c_1, c_2)}\right]^{\frac{1}{21}} - 1 = (g_1, g_2)$ (ditto, price index deflator)

Table A1 Data for Nordhaus/Tobin Method

Variables:-	R	S	B	C	Active Population			
					E	F	G	H
Country	GNP at 1950-52 prices		Ave: male hours worked		Male		Female	
	1971-73	1950-52	1950-52	1971-73	1950-52	1971-73	1950-52	1971-73
Austria	198.20	67.52	2080	1872	2,047	1,867	1,299	1,183
Belgium	392.36	913.62	2283	1872	2,597	2,656	1,009	1,321
Canada	54.16	21.03	2037	1865	4,166	6,038	1,146	2,981
Denmark	55.15	23.05	2283	1742	1,380	1,457	798	969
Finland	19.75	7.14	2104	1780	1,176	1,227	808	990
France	360.31	122.41	2146	2027	12,646	13,958	6,530	7,779
Germany	388.11	117.13	2275	1822	14,428	17,212	7,893	9,720
Italy	29,386	9,907	1997	1612	15,401	14,155	5,271	5,204
Japan	38,400	5,183	2185	2072	22,850	32,100	16,720	20,100
Norway	42.65	18.00	2163	1721	1,065	1,062	396	617
Sweden	75.94	34.26	2148	1700	2,285	2,358	819	1,611
U.K.	26.34	14.60	2195	2018	16,168	16,209	7,561	9,102
U.S.A.	683.12	322.24	1968	1940	46,581	55,649	19,183	33,338

Table A1 (contd.) Data for Nordhaus/Tobin Method

Variables:-	Inactive Population				Wage Rates				Consumer Price Index
	I	J	K	L	M	N	Ø	P	Q
	Male		Female		Male		Female		1971-73
Country	1950-52	1971-73	1950-52	1971-73	1950-52	1971-73	1950-52	1971-73	1950-52
Austria	369	707	1,599	1,401	9.42	38.62	6.27	29.27	1.954
Belgium	751	943	2,498	2,535	23.6	93.71	13.9	71.03	1.616
Canada	785	1664	3,704	4,861	1.30	3.79	0.86	2.87	1.630
Denmark	173	432	816	986	3.80	20.80	2.47	16.21	2.372
Finland	159	458	715	873	1.56	7.43	1.05	5.30	2.603
France	2,603	4,865	10,463	12,148	1.07	6.23	0.94	4.71	2.620
Germany	2,881	5,060	12,846	15,644	1.59	7.82	1.02	5.53	1.706
Italy	1,867	5,672	13,244	16,191	1.74	8.43	1.16	6.39	2.063
Japan	3,250	7,013	11,440	21,517	66.2	52.6	44.1	3.99	2.399
Norway	154	404	869	845	3.67	16.82	2.49	12.82	2.252
Sweden	385	824	1,917	1,638	3.30	17.49	2.31	14.65	2.284
U.K.	2,523	4,098	13,007	13,056	18.0	82.1	10.9	48.7	2.247
U.S.A.	8,694	17,516	37,596	45,616	1.65	3.95	0.96	2.29	1.607

Annex B Usher Method; Basic data and Calculation Sequence

(i) Variables (See Tables B1 and B2)

for each country with and without pensioners

(Data on a per capita basis throughout; see Tables B1 and B2 below)

		Units
A	Male leisure per capita 1971-73	Hours p.a.
B	Female leisure per capita 1971-73	Hours p.a.
C	Male wage rate 1950-52	Local currency
D	Female wage rate 1950-52	Local currency
E	Index real wage rate 1950-52-1971-73	Number
F	GNP per capita 1971-73 at 1950-52 prices	Local currency
G	GNP per capita 1950-52	Local currency
H	Male leisure 1959-52	Hours p.a.
I	Female leisure 1959-52	Hours p.a.

(ii) Calculation Procedure

(a) Usher (Method 'A')

Step		
1	C x E = J	(1971-73 real wage at 1950-52 prices, male)
2	D x E = K	(" " " " " " female)
3	A - H = L	(Inc. leisure per head 1971-73 - 1950-52 males)
4	B - I = M	(" " " " " " females)
5	L x J = N	(value increase leisure per head males)
6	M x K = P	(" " " " " females)
7	N + P = Q	(Total value increase leisure per head)
8	Q + F = R	('welfare' 1971-73 per head)
9	$\frac{R}{G}$ = S	(Index welfare - Usher A)
10	$S^{\frac{1}{19}} - 1 = T$	(Average annual compound growth rate - Usher A)

Above both for total population (P_1) and total population excluding pensioners (P_2)

Calculation Procedure (contd.)

(b) Usher(Method B)

Step		
1	A x E = U	(Leisure per capita 1971-73 in Efficiency Units 1950-52 male)
2	B x E = V	(" " " " " " " female)
3	U - H = W	(change efficiency units leisure per capita 1971-73 - 1950-52 male)
4	V - I = X	(" " " " " " " female)
5	W x C = Y	(Value increment per capita male)
6	X x D = Z	(" " " " female)
7	Y + Z = α	(Total value increment per capita)
8	α + F = β	('welfare' per capita 1971-73)
9	$\frac{\beta}{G}$ = γ	(Index welfare - Usher B)
10	$\gamma^{\frac{1}{n}} - 1 = \delta$	(Average annual compound growth rate welfare - Usher B)

Above both for total population (P_1) and total population excluding pensioners (P_2)

Table B1 Data for Usher Method

Variable:- / Country	Total population over 15				Population over 15 excluding pensioners				Total population	
	A	B	H	I	A	B	H	I		
	Leisure per capita 1971-73		Leisure per capita 1950-52		Leisure per capita 1971-73		Leisure per capita 1950-52		1971-73	1950-52
	Male	Female	Male	Female	Male	Female	Male	Female		
Austria	1,314	1,696	1,256	1,744	1,074	1,305	1,058	1,467	7,493	6,941
Belgium	1,415	1,639	1,351	1,708	1,183	1,302	1,129	1,431	9,713	8,682
Canada	1,340	1,479	1,288	1,489	1,188	1,289	1,113	1,324	21,860	14,050
Denmark	1,483	1,631	1,279	1,519	1,253	1,330	1,235	1,301	4,990	4,303
Finland	1,417	1,663	1,171	1,546	1,266	1,407	1,057	1,355	4,640	4,049
France	1,343	1,565	1,287	1,688	1,132	1,228	1,087	1,378	51,693	42,242
Germany	1,390	1,703	1,238	1,725	1,171	1,350	1,046	1,486	61,643	48,088
Italy	1,473	1,653	1,342	1,700	1,275	1,396	1,176	1,498	54,440	46,935
Japan	1,314	1,560	1,077	1,344	1,180	1,388	980	1,212	106,970	84,233
Norway	1,474	1,606	1,294	1,628	1,236	1,293	1,100	1,389	3,930	3,296
Sweden	1,553	1,674	1,334	1,647	1,290	1,342	1,119	1,400	8,120	7,072
U.K.	1,332	1,612	1,291	1,719	1,116	1,267	1,090	1,432	55,780	50,338
U.S.A.	1,314	1,545	1,333	1,577	1,140	1,300	1,159	1,382	208,763	154,355
Units	Hours per annum				Hours per annum				Thousand	

Table B2 Data for Usher Method (contd.)

Variable:-	C	D	E	F	G
Country	Wage Rate		Index real wage	GNP at 1950-52 prices (Per head of population)	
	Male	Female		1971-73	1950-52
Austria	9.42	6.27	2.170	26,451	9,728
Belgium	23.60	13.90	2.457	94,062	45,192
Canada	1.30	0.86	1.856	2,478	1,497
Denmark	3.80	2.47	2.435	11,052	5,357
Finland	1.56	1.05	1.890	4,256	1,763
France	1.07	0.99	2.136	6,970	2,898
Germany	1.59	1.02	2.926	6,296	2,436
Italy	174	116	2.432	539,419	211,079
Japan	66.2	44.1	3.429	358,979	61,531
Norway	3.67	2.49	2.035	10,852	5,461
Sweden	3.30	2.31	2.406	9,352	4,844
U.K.	0.180	0.109	2.030	472	290
U.S.A.	1.65	0.96	1.490	3,272	2,088
Units:-	Local currency			Local currency	

Table B3 Basic Data Used for Derivation of Usher Method Variables as shown in Tables B1 and B2

Country	Including Population Aged 65 and Over				Excluding Population Aged 65 and Over			
	Leisure 1971-73		Leisure 1950-52		Leisure 1971-73		Leisure 1950-52	
	$A_{(male)}$	$B_{(female)}$	$H_{(male)}$	$I_{(female)}$	$A_{(male)}$	$B_{(female)}$	$H_{(male)}$	$I_{(female)}$
Austria	9,849	12,707	8,720	12,105	8,049	9,782	7,342	10,181
Belgium	13,748	15,916	11,727	14,829	11,493	12,646	9,798	12,426
Canada	29,299	32,337	18,103	20,915	25,972	28,172	15,635	18,601
Denmark	7,402	8,138	5,502	6,535	6,250	6,638	5,315	5,599
Finland	6,575	7,715	4,740	6,259	5,874	6,530	4,280	5,486
France	69,413	80,915	54,372	71,295	58,515	63,464	45,899	58,224
Germany	85,689	104,981	59,515	82,956	72,205	83,246	50,287	71,442
Italy	80,182	90,003	62,985	79,791	69,423	75,981	55,176	70,322
Japan	140,507	166,841	90,709	113,194	126,264	145,521	82,543	102,082
Norway	5,793	6,314	4,265	5,367	4,857	5,082	3,626	4,578
Sweden	12,614	13,591	9,436	11,647	10,472	10,899	7,915	9,898
U.K.	74,287	89,904	65,007	86,554	62,241	70,664	54,869	72,105
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